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ABSTRACT

The manatee is known for its gentleness and uniqueness and has become a symbol of human concern for endangered species. This guide provides current information on the West Indian manatee as well as strategies for teaching about this endangered animal. While focusing on the manatee, this guide points out the importance of interdependencies within the whole ecosystem with the goal of promoting informed decision-making, responsible behavior, and constructive actions towards the protection of the manatee and its habitat in Florida. The activities included can be adapted to suit the special needs, ages and abilities of different students and are designed for multidisciplinary study areas. Accompanying this guide is a color poster, "Sirenians of the World," depicting the West Indian manatee and four related species. Topics covered include: natural history, habitat, the hydrologic cycle, other sirenian species, marine mammals, problems, manatee mortality, research and conservation, and public awareness. A list of manatee resources, reference books and audio-visual aids is included. (JRH)

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MANATEES
AN EDUCATOR'S GUIDE

Fourth Edition

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The West Indian manatee has captured the imagination of people across the country during the last two decades. Public awareness in Florida has also increased dramatically, especially since 1975, when the manatee was designated as the state's aquatic mammal. Today the manatee is known for its gentleness and uniqueness, and has become a symbol of human concern for endangered species.

"MANATEES — An Educator's Guide" provides current information on the West Indian manatee as well as strategies for teaching about this endangered animal. Information about its physiology, behavior, habitat, related species, causes of mortality, and efforts at conservation is included. Of course, a problem with a single species is often a problem interrelated with our environment and the natural resources on which we commonly depend. While this guide focuses on the West Indian manatee, the importance of interdependencies within the whole ecosystem and the role the manatee plays should be kept in appropriate context. We hope that the use of this guide will result in informed decisions, responsible behavior, and constructive actions towards the protection of the manatee and its habitat in Florida.

We encourage you to copy and distribute the material in this booklet. Activities can be adapted to suit the special needs, ages, and abilities of your students and are designed for multidisciplinary study areas.

Accompanying this guide is a 4-color poster, "Sirenians of the World," depicting the West Indian manatee and four related species.

Also available are: "Manatee Messages: What You Can Do!" An exciting new education videotape for students and teachers, produced by Save the Manatee® Club (SMC) with assistance from the Florida Advisory Council on Environmental Education (FACEE). This 1/2" VHS videotape (approximately 12 minutes in length) has been distributed to schools throughout Florida, and educators should check their district media centers for availability. Out-of-state educators and other interested parties may purchase a video for $9.00 (total cost). The following formats exist: (1) Secondary Level (Grades 6-12), (2) Open Captioned Secondary Level, (3) Elementary Level (Grades K-5) and (4) Open Captioned Elementary Level. Written permission may be obtained by writing Save the Manatee® Club to duplicate and/or broadcast this program.

Adopt-A-Manatee Program: School groups or classes can adopt an endangered manatee for **$10.00** through Save the Manatee® Club. With adoption/membership, classes will receive an adoption certificate, an underwater photo and case history of the adopted manatee, and a variety of educational materials. In addition, classes will receive the Save the Manatee® Club Newsletter four times a year, complete with adoption updates, education articles, and information on manatee-related issues.

We hope that this manatee package will encourage you and your students to become more aware of our fascinating natural world and work to preserve its wonders for generations to come.

EDUCATION IS THE KEY...

First Edition 1985 — Written by Judith Delaney, Wendy Hale, and Renee Stone

Second Edition 1989 — Revised and written by Majorie Lamphear
Graphics and illustrations by Mary Ruth Sprankel
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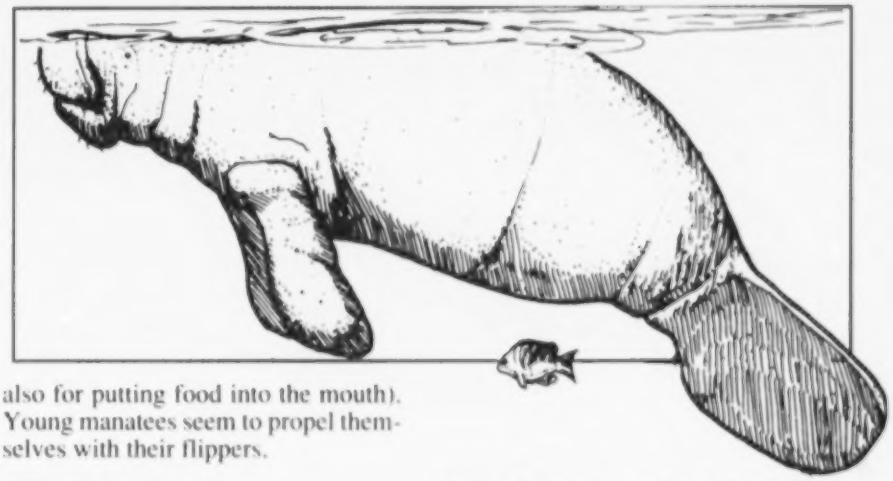
Produced by Save the Manatee® Club. For further information on manatees, write Save the Manatee Club, 500 N. Maitland Ave., Maitland, FL 32751 or call 1-800-432-JOIN.

Natural History

Description—West Indian Manatee

The West Indian manatee is a large, gray-brown, aquatic mammal. Its seal-like body tapers to a flat, paddle-shaped tail, and two small forelimbs on the upper body have three to four nails on each flipper. The head and face are wrinkled and the snout has stiff whiskers.

Adults have been known to exceed lengths of thirteen feet and weigh over 3,500 pounds; however, this is quite above average. Manatees usually average around 10 feet in length and weigh somewhere between 800 and 1200 pounds. At birth, manatees are three to four feet long and weigh between 60 and 70 pounds.



Physiology

Manatees have a large digestive system, and unique, continuously replacing molars to cope with an herbivorous diet. The manatee eats abrasive plants that wear down these molars. As an adaptation, new molars form at the back of the jaw and move forward, pushing out the oldest, most worn-out teeth. The rate of molar movement depends on how fibrous the plants are.

The manatee's eyes are small and have a nictitating membrane that can be drawn across the eyeball for protection. Manatees have fairly good visual acuity and can distinguish between different-sized objects, different colors and patterns.

Manatees emit sounds underwater that are believed to be used in communicating with one another, and not for navigational purposes. Vocalizations may express fear, anger, or sexual arousal. They are also used to maintain contact, especially when manatees are feeding or traveling in turbid water. Especially common are vocalizations between cow and calf. (A cow and calf once separated by a flood gate vocalized constantly for 3 hours until reunited.)

Adult manatees move through the water primarily by the pumping action of the tail. The front flippers are used for steering and lateral movement or crawling over the water bottom (and also for putting food into the mouth). Young manatees seem to propel themselves with their flippers.

Behavior

Manatees spend most of their time feeding (six to eight hours a day) and resting (two to twelve hours a day). They graze for food along water bottoms and on the surface. They may rest submerged at the bottom or just below the surface, coming up to breathe on the average of every 3 to 5 minutes. Intervals between breaths depend upon activity level. When the manatee is using a great deal of energy, it may surface to breathe as often as every 30 seconds. When just resting, manatees have been known to hold their breath as long as 20 minutes.

Manatees are agile and have been observed in loosely organized, playful activities such as body-surfing and barrel rolling.

Manatees are not territorial. Because the manatee has evolved with no natural enemies, it has not needed the protection/cooperation of a herd. Consequently, they are semi-social, somewhat solitary animals. They sometimes gather in small, informal groups, but have no leader, or real structure.

Breeding and Reproduction

Manatees do not form permanent pair bonds. During breeding, a single female, or cow, will be followed by a group of a dozen or more males, or bulls, forming a mating group. They appear to breed at random during this time. Although breeding and birth may occur at any time during the year, there appears to be a slight spring calving peak.

Manatees usually bear one calf, although twins have also been recorded. Intervals between births range from two to five years (a two year interval may occur when a cow loses a calf soon after birth). The gestation period is approximately thirteen months. Mothers nurse their young for a long period and a calf may remain dependent on its mother for up to two years. The cow assumes total responsibility for raising the calf without the bull. Calves nurse under water from a nipple located behind the cow's flipper and begin to eat plants a few weeks after birth.

Scientists believe females do not become sexually mature until five to nine years of age. They live long lives—it is believed that manatees are capable of living 60 years or more. One manatee in captivity is now over 45 years old, but because of the many perils in the wild, longevity is uncertain. Because the reproductive rate is so low, the species as a whole adapts very slowly to changing situations or unnatural stress.

The current population is estimated at a minimum of 1,800 animals. The manatee was officially declared endangered in 1973, as part of the original endangered species listing for the Federal Endangered Species Act.

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Habitat

Range

The United States manatee population is concentrated primarily in Florida. Manatees are susceptible to cold-related disease and in the winter congregate near natural springs, which have a constant 72 degree F. temperature, or warm effluents of power plants or other industrial outfalls. Water temperatures below 68 degrees F. usually cause manatees to move into these warmer refuge areas. Individual manatees often return to the same wintering areas year after year.

Between late March and November manatees migrate freely around Florida's rivers and coastal waters. A few may range as far north as the Carolinas and as far west as Louisiana during the summer months, but these sightings are rare.

Habitat

Manatees are found in shallow, slow-moving rivers, bays, estuaries, and coastal water ecosystems. They can live in fresh, brackish, or salt water. These habitats provide them with sheltered living and breeding areas, a steady, easily obtainable food supply, and warm water—all of which manatees need to survive.

Food

Manatees are herbivores, feeding on a large variety of submerged, emergent, and floating plants. They can eat 10-15% of their body weight of vegetation daily. Seagrass beds are important feeding sites. Many of these coastal and estuarine feeding areas are particularly vulnerable to destruction by dredge and fill activities, surface water run-off from nearby construction sites or agricultural lands, herbicide spraying, and prop dredging.

While coastal and estuarine vegetation is declining, quite another problem is occurring in our fresh water bodies. In recent years, Florida has experienced an influx of exotic species, including freshwater vegetation. Because exotic species originate elsewhere and are not native to Florida, they have no natural enemies here, and consequently can grow unchecked. Our fresh water bodies have become clogged with such vegetation. Manatees eat exotic plants and in certain areas may help keep a water body clear, but there aren't enough manatees to control these unwanted plants in all the areas where they are found.

Some favorite foods of the manatees in Florida include:

Marine Vegetation

- *Syringodium filiforme* / Manatee grass
- *Thalassia testudina* / Turtle grass
- *Ruppia maritima* / Widgeon grass
- *Halodule beaudettei* / Shoal grass

Freshwater Vegetation

- *Hydrilla verticillata* / Florida elodea
- *Najas guadalupensis* / Southern naid
- *Myriophyllum spicatum* / Eurasian watermilfoil
- *Vallisneria neotropicalis* / Tapegrass, Eelgrass
- *Ceratophyllum demersum* / Coontail
- *Eichornia crassipes* / Water hyacinth
- *Pistia stratiotes* / Water lettuce

The Four Necessary Elements of Habitat

Suitable habitat for the manatee (as well as for any living being) must provide four basic elements:

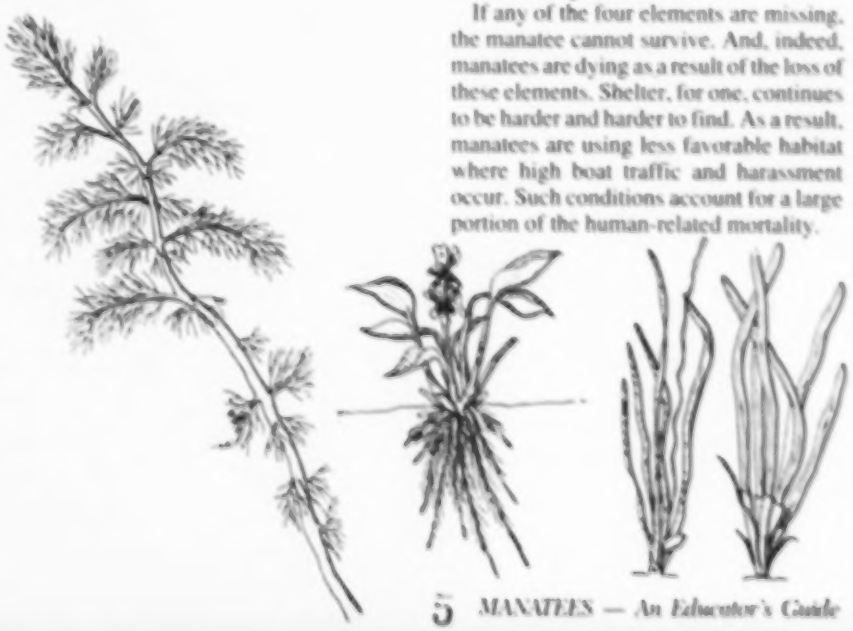
Food. Considering the amount that manatees eat, suitable habitat must provide an abundance of aquatic plants to sustain the manatees using an area.

Water. Manatee intake of water occurs while eating aquatic plants as well as drinking. Recent research at Texas A&M University (funded by SMC) suggests that manatees in salt water do not need to drink fresh water for extended periods. This may explain why manatees can go so easily from fresh to salt water environments. It also means that people who are turning on hoses for manatees in salt water can turn them off. Currently, research has been proposed to study manatees in salt water being fed a natural sea grass diet to analyze how these animals deal with a strictly marine habitat.

Space. Manatees require space to move about. They are migratory and the space (range) they require is influenced by seasonal change. Travel corridors, or passageways, are necessary for the manatee to move back and forth between summer and winter habitats. (It has been documented that many manatees have preferred habitats that they return to year after year.)

Shelter. Manatees must have a safe, protected area—away from harassment, boat traffic, strong current, etc.

If any of the four elements are missing, the manatee cannot survive. And, indeed, manatees are dying as a result of the loss of these elements. Shelter, for one, continues to be harder and harder to find. As a result, manatees are using less favorable habitat where high boat traffic and harassment occur. Such conditions account for a large portion of the human-related mortality.



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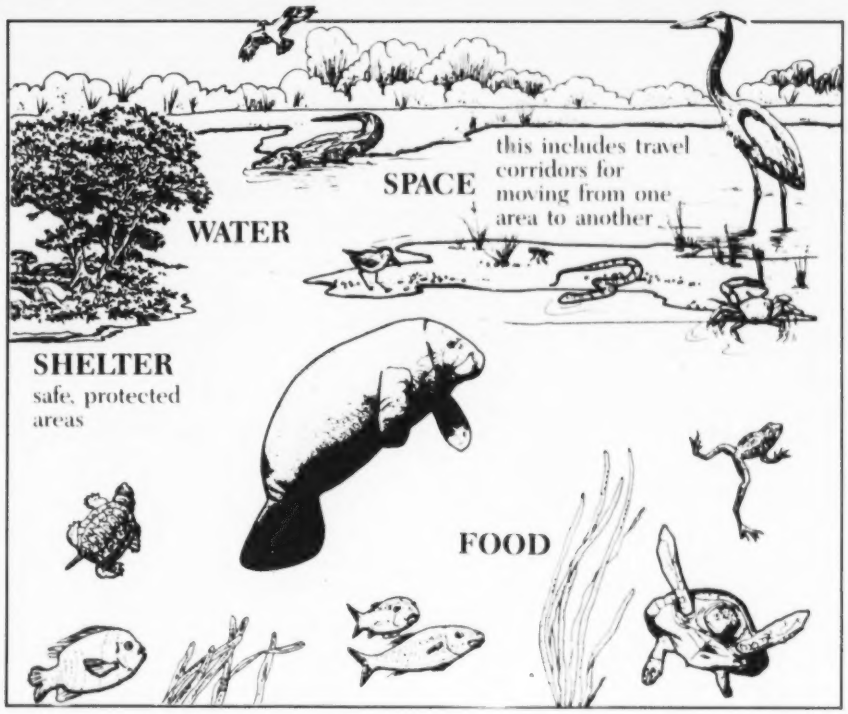

Habitat Activities

- *Arrange a field trip to a manatee sanctuary (see page 20 for a listing) sometime during the winter months, or visit a marine park which displays manatees or other marine animals to help students experience these animals first hand.*

- *Discuss how climate restricts a manatee's movements. Why must manatees live in certain areas?*

- *People can buy or make things they need to eat or keep warm. Manatees and other wildlife must rely on natural resources found in their environment. Where does the manatee find these resources?*

- *Compare the manatee with other animals that share its habitat. What characteristics help each animal live in its particular niche? Compare the manatee with other animals that live in different environments such as land animals. How is each adapted to its particular lifestyle?*

- *Make a plaster cast of a manatee habitat such as a spring run. Include details like grasses, trees, fish, access to a river, sanctuary signs, boats, rangers, etc., or draw posters of the manatee in its habitat.*

- *Have students find or draw pictures of plants manatees might eat.*

- *Manatees and people share habitat, too. The riverways that manatees depend on for survival are also used by people for transportation, commercial fishing, and recreation. Can people share habitat with manatees and all wildlife without degrading the quality of Florida's natural resources?*

- *Have students list other animals that might share the manatee's habitat. For example, fish, otters, turtles, insects, snakes, alligators, and birds all share Florida's river systems. Draw pictures of them sharing this habitat.*

- *Florida has a special responsibility to protect the manatee, which depends almost entirely on the quality and stability of the state's natural resources. Have students discuss this responsibility. What can we do to insure the sound management of resources for the manatee?*

- *Discuss herbivores, carnivores, and omnivores. Manatees are herbivores. What do other aquatic animals eat? Have students list several animals and identify them as herbivores, carnivores, or omnivores.*

- *Take each of the four necessary elements of habitat, one at a time, and discuss why each is necessary for manatee survival. (Example: Some people believe that saving the manatee will require moving the population to a restricted area, away from the areas most used by humans. This certainly takes care of shelter, but it restricts space. What would happen in winter when the manatee needed a warm water refuge and couldn't get to it? Or, what about food supply in a restricted area with a large number of manatees—would it last?)*

- *A major threat to the manatee is the loss of habitat. The Indian River Lagoon on Florida's east coast has experienced substantial losses. For example, it has lost 80% of its mangrove marshes through impoundment for mosquito control purposes, and 30% of its seagrass beds. Have students research an area close by to determine similar habitat losses. Have students draw a picture representing the habitat of 20 years ago, then have them cross out a portion to represent the percentage lost. Discuss the consequences of this habitat loss for manatees and other species.*

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The Hydrologic Cycle

If manatees are to be protected, their habitat must also be preserved. Manatees, humans, and all forms of life are dependent on clean, available water. In Florida, it is imperative to understand the importance of water—where it originates, where it goes, and how our health and the manatee's is affected by its quality and quantity.

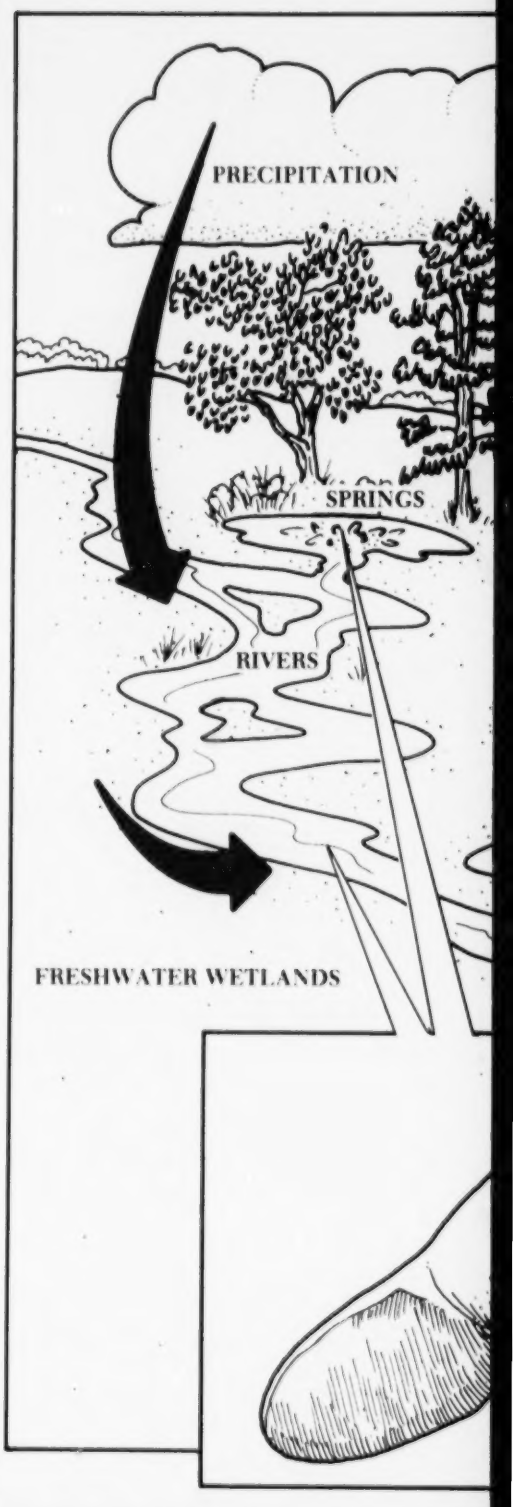
Water covers three quarters of the earth's surface and much of Florida's surface area. All water on the planet is part of the hydrologic cycle, and is constantly circulating from one part of the system to another in finite amounts.

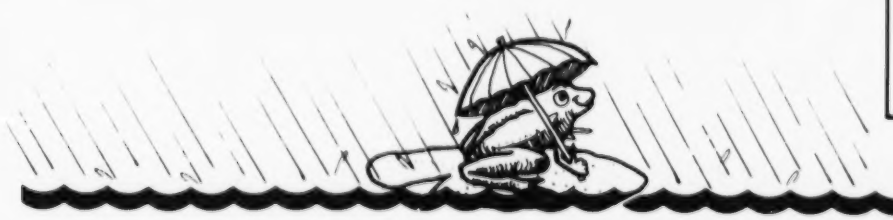
Water is found in many forms—solid, liquid, and gas—and in many bodies, such as oceans, rivers, springs, lakes, wetlands, and aquifers. Surface water evaporates. It is carried through the earth's atmosphere as vapor, and then falls as precipitation. Precipitation, or rain, that falls over land can become runoff, eventually flowing into lakes, rivers, or wetland areas. Some precipitation percolates into the ground. This is called infiltration. Water is absorbed by plants, which in turn give some water back to the atmosphere from the surface of their leaves. This recycling is called transpiration. Excess precipitation seeps below the ground to become groundwater. Sometimes groundwater is stored in aquifers, which provide much of Florida's drinking water. Sometimes groundwater flows underground to an opening in the substrate and becomes a natural upwelling or spring.

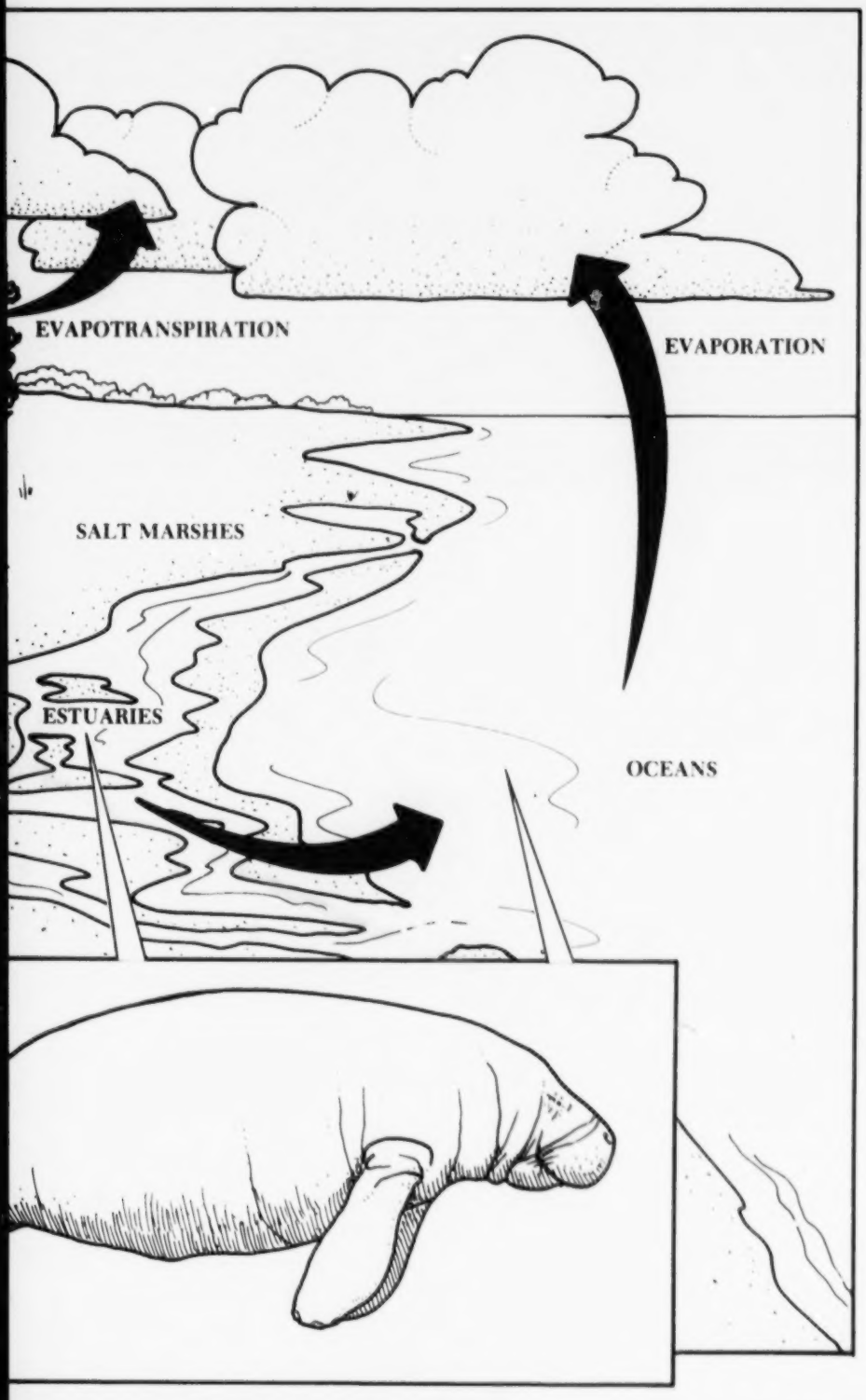
Florida has about 320 known springs. Many of the large springs are havens for manatees in winter months because the water temperature of springs is relatively constant throughout the year, averaging about 72 degrees F. When surrounding river waters chill, manatees move into these springs to keep warm. Springs serve as refuges for manatees and as important indicators of the health of hydrologic conditions.

Much of Florida's surface area is covered by wetlands. The term "wetlands" describes many different types of aquatic environments, including coastal and inland marshes, ponds, bogs, wooded swamps, bottomland hardwood forests, and wet meadows. Wetlands intercept runoff and are a natural water treatment facility. In many parts of the state, wetland areas help to prevent salt-water intrusion into fresh water supplies, which would make drinking water unpotable. Wetlands remove silt and filter out many pollutants, including harmful chemicals, all of which can pollute manatee habitat and human water supplies. However, if pollutants are concentrated in high levels, wetlands can be altered or destroyed and their usefulness diminished or eliminated entirely.

Manatees move through a variety of aquatic habitats in Florida and are dependent on the health of these aquatic ecosystems as well as the integrity of the hydrologic cycle. All life forms on earth are similarly dependent to various degrees.







Activities

- *Discuss how all forms of life, including man and manatee, are dependent on natural resources such as clean water and air, and how water contamination affects all living things.*
- *List some possible ways to clean up Florida's waterways.*
- *As a class, participate in a local clean-up campaign in your community that would be beneficial to the manatee.*
- *Much of Florida lies over an immense water supply called the Floridan Aquifer. Many communities in Florida rely entirely on aquifers for drinking water and other water needs. Read more about the aquifer system in Florida and research your community's water system. Do you rely on an aquifer for your water needs?*
- *Plan a field trip to your local water treatment plant for a first hand look at where your water comes from.*
- *Start a class project on water conservation and make a list of things that each student can do at home to conserve water.*
- *Kissengen Spring near Bartow, Florida, stopped flowing in 1950. What could have caused the spring to stop flowing? Do you think manatees might have used this spring as a warm water refuge? What did they do when the spring disappeared?*
- *Ponce de Leon "discovered" Florida in 1513. Write an essay on how Florida, and specifically manatee habitat, would have looked when the first Europeans came here. We do know that Christopher Columbus saw manatees, and that Ponce de Leon was on Columbus' second voyage. Since Ponce de Leon had much contact with the Indians who used the manatee as a food source, could Ponce de Leon have known of the manatee?*
- *Make a list of other early European explorers who might have come in contact with the manatee.*

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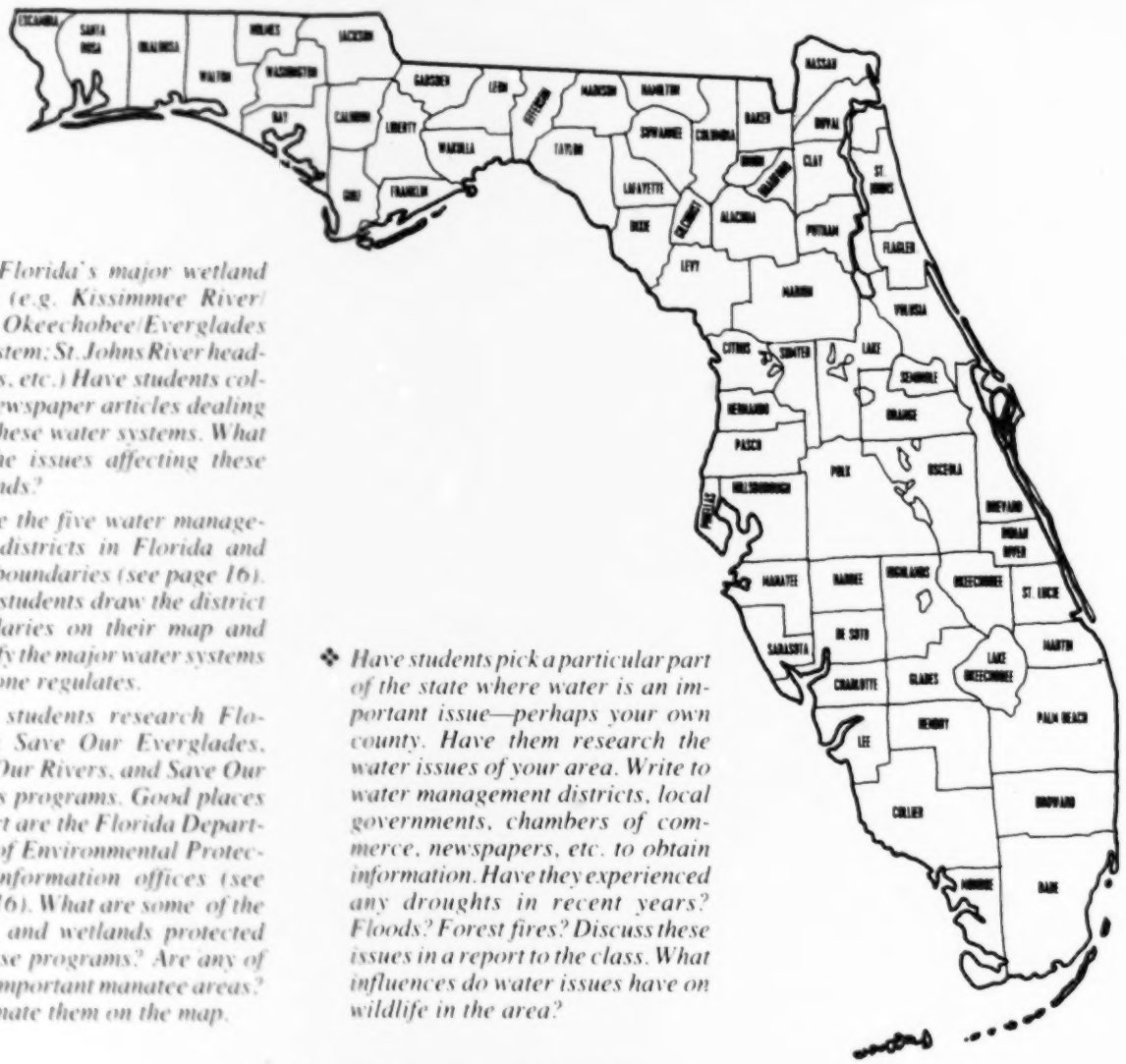
Use state and county maps for the following activities:

- *Locate important waterways such as major rivers and bays that are used by manatees. Label them on the map.*
- *Identify manatee refuges in Florida (see page 20 for a listing of sanctuaries).*
- *Designate between winter and summer ranges by coloring or shading with green for summer and blue for winter.*
- *Use the map to plan a trip. Pretend you are a manatee and decide where you are going and why—to escape the cold? to find better food? to visit your cousin? How many days will you be gone? How many miles will you travel? Depending on when you leave, write a story entitled "My Summer (or Winter) Vacation as a Manatee."*
- *Establish a class manatee sighting and mapping program where all manatee sightings are plotted on a county map with color coded push pins for different months or keyed to different types of manatee information such as numbers of manatees included in the sighting, approximate age, size, etc.*
- *Find the latitude and longitude of several manatee refuge areas in Florida. On a world map locate latitude and longitude for related species (see page 7) in different parts of the world. How do they compare?*
- *On a Florida map try to trace the steps of the hydrologic cycle. Where would water evaporate from? Run off?*



- *Find Florida's major wetland areas (e.g. Kissimmee River/Lake Okeechobee/Everglades ecosystem; St. Johns River headwaters, etc.) Have students collect newspaper articles dealing with these water systems. What are the issues affecting these wetlands?*
- *Locate the five water management districts in Florida and their boundaries (see page 16). Have students draw the district boundaries on their map and identify the major water systems each one regulates.*
- *Have students research Florida's Save Our Everglades, Save Our Rivers, and Save Our Coasts programs. Good places to start are the Florida Department of Environmental Protection information offices (see page 16). What are some of the rivers and wetlands protected by these programs? Are any of them important manatee areas? Designate them on the map.*
- *Have students pick a particular part of the state where water is an important issue—perhaps your own county. Have them research the water issues of your area. Write to water management districts, local governments, chambers of commerce, newspapers, etc. to obtain information. Have they experienced any droughts in recent years? Floods? Forest fires? Discuss these issues in a report to the class. What influences do water issues have on wildlife in the area?*

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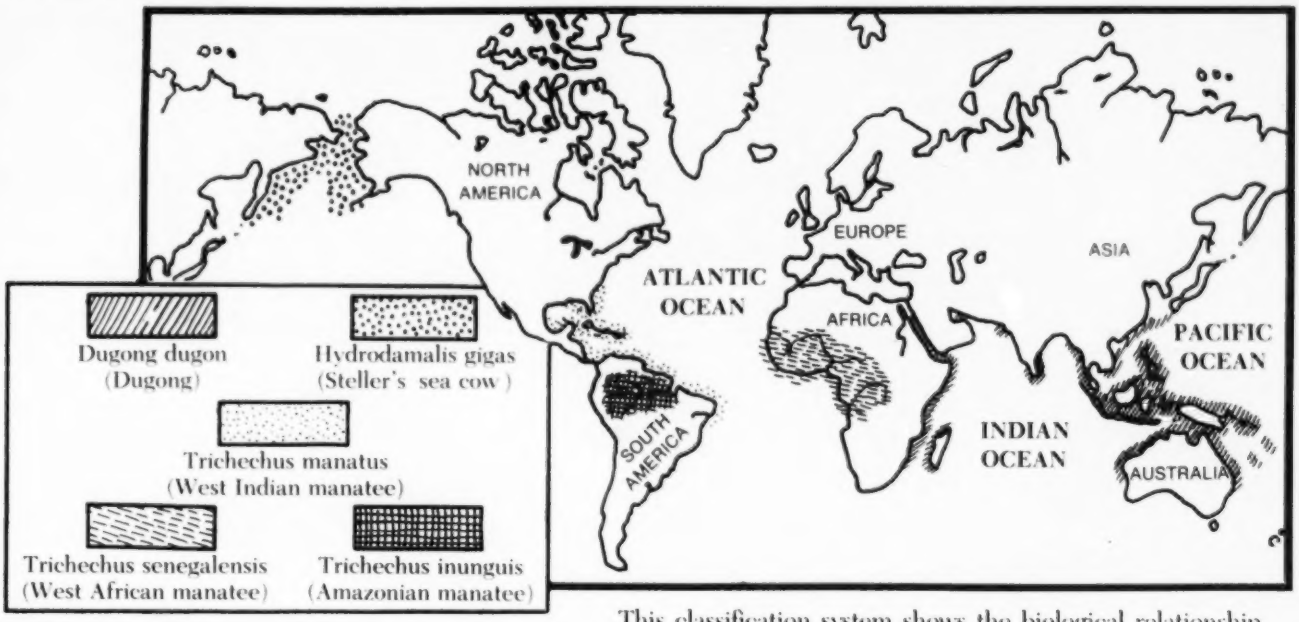
Other Sirenian Species

Other living members of the Order Sirenia are found in aquatic habitats similar to that of the West Indian manatee. Because of their herbivorous nature, all are found in relatively shallow waters where sunlight can penetrate and stimulate plant growth.

The Amazonian manatee lives exclusively in inland, freshwater areas, while the dugong prefers coastal and marine ecosystems. Although little is known about the West African manatee, it also inhabits tropical and subtropical waters. The only sirenian species to inhabit cold waters was Steller's sea cow, hunted to extinction within 27 years of its discovery in 1741 in the Bering Strait.



This classification system shows the biological relationship between various species of sirenians.

Sirenian Taxonomy

Kingdom —	*Animalia*
Phylum —	*Chordata*
Class —	*Mammalia*
Order —	*Sirenia*

Family — Trichechidae

- Genus — Trichechus
  - Species — Trichechus inunguis (Amazonian manatee)
  - Species — Trichechus senegalensis (West African manatee)
  - Species — Trichechus manatus (West Indian manatee)
    - Subspecies — Trichechus manatus latirostris (Florida manatee)
    - Subspecies — Trichechus manatus manatus (Antillean manatee)

Family — Dugongidae

- Genus — Dugong
  - Species — Dugong dugon (Dugong)
- Genus—Hydrodamalis
  - Species — Hydrodamalis gigas (Steller's sea cow) Extinct

Activities:

- *Is the West Indian manatee more closely related to the dugong or to the Amazonian manatee? How can you tell?*
- *Is the extinct Steller's sea cow more closely related to the dugong or to the West Indian manatee? How do you know?*
- *Name two species that are in the same genus.*
- *Name two genera that are in the same family.*
- *Which of the five sirenian species has the widest range?*
- *Which species of Sirena has the most southerly range?*
- *The description of the West African manatee suggests that it very closely resembles the West Indian manatee. Looking at the world map, how could the resemblance between species separated by the Atlantic Ocean support the theory of continental drift?*

Marine Mammals

Marine mammals are specially adapted animals that live totally or partially in the water. As mammals, they breathe air, nurse their young, have backbones, body hair, and warm blood. Sirenians are unique because they are the only marine mammals that feed exclusively on plants.

Marine mammals are highly adapted to live in aquatic environments. Their streamlined bodies facilitate swimming; layers of body fat, or blubber, provide some insulation against low water temperatures; and other adaptations help them to see, breathe, and navigate in the water.

Though marine mammals have much in common because of their physical structure and aquatic habitat, each is adapted to its own particular lifestyle and niche. Marine mammals that live in cold areas or deep water have developed better insulation than the manatee requires in its tropical home. Predators or carnivores such as the polar bear and killer whale must have speed, strength, and weapons such as sharp, biting teeth or claws to catch and kill prey. The manatees' vegetarian diet requires grinding molars, and less proficient swimming ability.

Manatees, and many other marine mammals, never entirely leave the water during their lifetime. Calves are born and nursed in the water and manatees breed, rest, and feed in the water. They surface to breathe air. Some marine mammals—seals and polar bears for instance—go ashore to breed and raise their young, returning to the ocean to feed. Many whales must dive to great depths to find food, so their breath-holding capacity must be greater. The manatees' shallow water diet does not require this.

Even though marine mammals share some common characteristics and problems, each is unique and occupies a special niche in the aquatic environment.

Marine Mammal Activities

- *Compare and contrast the manatee with another marine mammal. Discuss food and feeding habits, temperature and depth preference, speed, physical characteristics and adaptations, breeding, habitat, climate, and other interesting details.*
- *Using the species pictured on the following page, discuss how each animal is suited to its habitat. How is it adapted to find food? Identify the carnivores, omnivores, and herbivores.*
- *Compare manatees to humans. What special equipment must people use to move comfortably underwater? How is a manatee better suited to an aquatic life? Why do people have hands and manatees have flippers? How does the manatee's shape help it move through the water?*
- *Compare the manatee (a mammal) to other aquatic animals of different vertebrate classes. The sea turtle (reptile), shark (fish), and penguin (bird) share some important characteristics, but are also different in many ways. Compare how each is adapted to its particular lifestyle.*
- *Stress the uniqueness and variety of nature as evidenced by the variety within the marine mammal grouping. Let students try to think of ways manatees could be better adapted to their habitat.*
- *Many marine mammals are hunted commercially for their meat, blubber, or fur. Have students research one of these animals and find out how hunting pressures have affected the population. Is the species considered endangered? Is it protected? There are specific laws (see page 15) that protect marine mammals. Find out about them.*
- *Discuss the word "stranding" and "beaching" and how it relates to marine mammals (e.g., whales, porpoises). Have students research the current theories on why some marine mammals strand themselves. Could this happen to the manatee?*
- *Why can manatees live a relatively solitary life when many other animals, including people, need the protection or company of a group? Which other animals live in groups and why?*
- *Pick 10 animals of different species and find out what term is used for male, female, and young. For manatees, it is bull, cow, and calf.*
- *Find out what the gestation period is for other mammals such as elephants, whales, humans, or cats. How old are individuals before they produce young?*

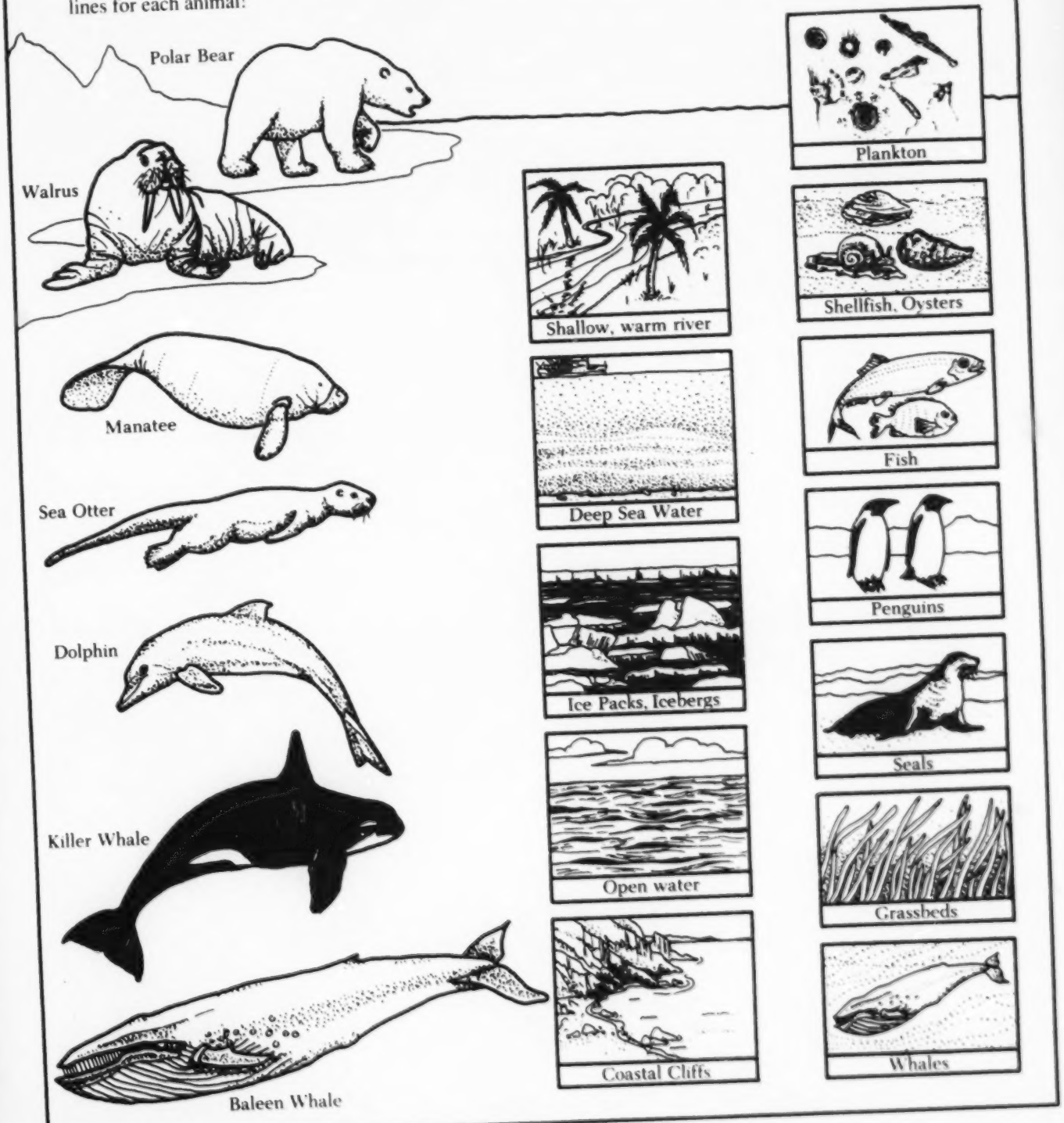
Marine Mammals Match-Up Answers

FOR PAGE 9

Species	*Habitat*	*Food*
Polar Bear	Ice packs, Icebergs	Fish, Seals
Walrus	Coastal cliffs	Shellfish, Oysters
Manatee	Shallow, Warmwater rivers & estuaries	Grassbeds
Sea Otter	Open water	Shellfish, Oysters
Dolphin	Open water	Fish
Killer Whale	Deep sea water	Seals, Penguins, Whales
Baleen Whale	Deep sea water	Plankton

Marine Mammal Match-Up

Find the favorite food and habitat of these marine mammals and match them up by using different colored lines for each animal!



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Problems

Research over the last several years has attempted to identify and quantify West Indian manatee distribution, population size, and causes of mortality to better understand this animal's life history and threats to its survival. Data gathered have isolated several causes of manatee deaths, most of which are directly related to human contact or encroachment. If these sources of mortality are not controlled, the manatee may become extinct.

Human Related Mortality

Loss of Habitat

Ultimately, loss of habitat is the most serious threat facing the manatee (as well as other Florida wildlife) today. Florida, the fourth most populous state in the nation (based on 1992 figures) is experiencing unprecedented growth. Nearly 1000 people are moving to this state every day. Over 75% of all Floridians migrated from elsewhere, and half of these people moved to Florida within the past 15 years (based on 1990 figures). In 1993, 40.5 million people visited the state of Florida. The growth in human population with its added pollution, litter, and boat traffic, has degraded and/or eliminated manatee habitat. Many fresh water and marine grassbeds have been lost due to water pollution, herbicides, surface runoff, propeller dredging, and dredge and fill projects. There are very few places left where the manatee is free from the danger, stress, and harassment posed by human activity.

Watercraft Collision

West Indian manatees can swim up to 15 miles per hour, but they usually swim about three to five miles per hour. Because the manatee is slow moving, needs to surface to breathe air, and prefers shallow water, it is vulnerable to boat hits. Sensing danger, the manatee will attempt to get away, but often there is not time to get out of the path of a speeding boat. And frequently there isn't sufficient depth to dive deeper. Consequently, the manatee suffers injury and death due to the crushing impact of the hull and/or the slashing impact of the propellers. In the case of large power vessels and barges moving through shallow waters, the manatee may be caught between the vessel and the water bottom, or the vessel and docking structure, and crushed.

Pollution

Water pollution caused by many of the household items we use in our daily lives (pesticides, herbicides, detergents, etc.), as well as storm water runoff and industrial chemicals, may poison waterways, food sources, and manatees themselves. Oil exploration and possible oil spills are potential threats to all marine and estuarine habitats.

Litter

Debris in waterways, such as discarded fishing line and hooks, plastic 6-pack holders, plastic bags, etc., are dangerous to manatees and other forms of wildlife. Entanglement in or ingestion of monofilament line/litter, carelessly left floating with aquatic plants have caused manatee injuries and even deaths. Crab trap lines and hoop nets used by commercial fishermen can also cause problems for manatees.

Harassment/ Vandalism

Harassment by boaters, divers, swimmers, and people fishing can force manatees to leave preferred habitat such as warm water refuges. Harassment can also lead to separation of mother and calf. Harassment refers to any act which causes the manatee to change its behavior and can include; pursuing, chasing, poking, prodding, grabbing, riding, and FEEDING a manatee or giving them water from a hose. (This disrupts their normal behavior and conditions them to take food or water from people. Some people may use this opportunity to feed them dangerous non-food items or harm the manatee in some way.) Accounts of vandalism and even poaching have been reported in Florida and resulted in several manatee deaths. Save the Manatee® Club supports passive observation as the best way to interact with manatees and all wildlife.

Flood Control Structures

Manatees can be crushed in the closing of flood gates and canal locks that are used to control water levels throughout the state. This problem is particularly acute in south Florida. Deaths due to drowning have also occurred when the tremendous suction created by water rushing through opening gates pins animals under the water. In recent years, the South Florida Water Management District and the U.S. Army Corps of Engineers have been working to monitor the opening and closing of these structures to help prevent this type of death from occurring.

Natural Mortality

Cold Weather

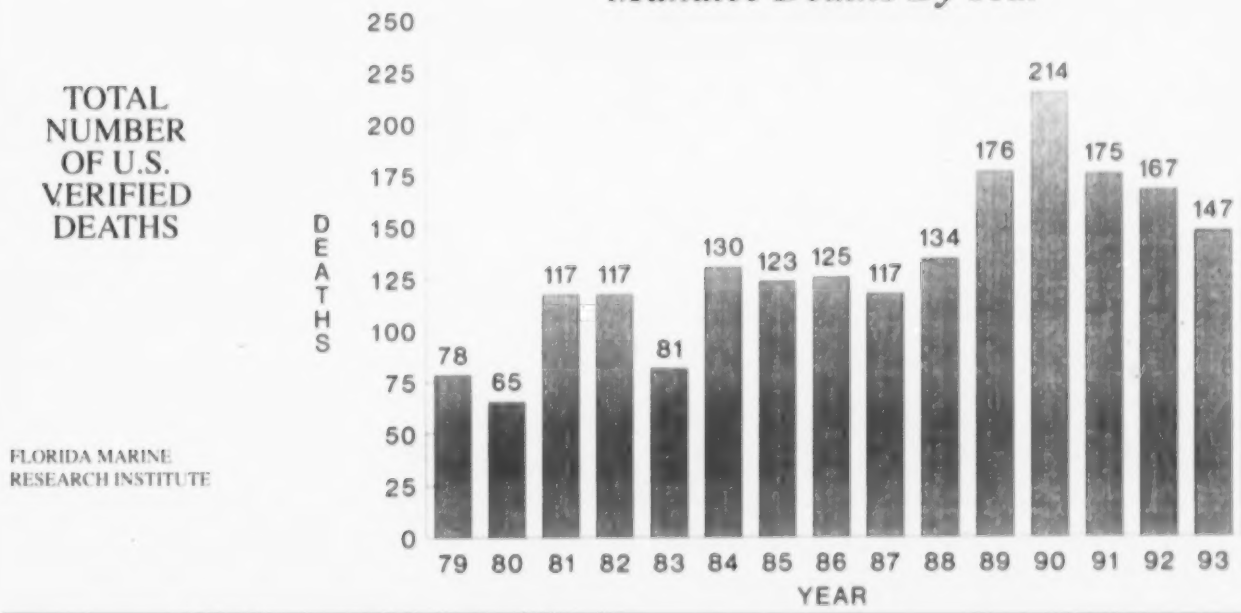
During winters in Florida that have been unusually cold, an increase in manatee mortality has been documented. Manatees cannot tolerate temperatures below 68 degrees F. (20 degrees C.) for long periods of time. Researchers believe that individuals affected by the cold cannot produce enough metabolic heat to make up for heat loss due to environment.

Red Tide

In 1982 an outbreak of red tide—a toxic, water-born, microscopic marine organism—occurred in southwest Florida and was believed to have contributed to the death of 37 manatees. Many of the dead manatees had accidentally ingested tunicates or sea squirts which contained concentrations of these toxic organisms. The sea squirts were probably ingested accidentally as the manatees fed in surrounding seagrass beds.

Manatee Mortality Statistics

Manatee Deaths By Year



Scientists break down the causes of manatee deaths into six different categories:

- **Watercraft Collisions**
- **Flood Gate or Canal Lock (crushed/drowned)**
- **Other Human Related (deaths caused from monofilament line/ litter, poaching, vandalism, culverts/human-made structures)**
- **Undetermined (too badly decomposed, inconclusive necropsy finding, reported and verified but not recoverable)**
- **Dependent Calf (perinatal, < 4.9 ft/150 cm)**
- **Other Natural (cold, stress, red tide, disease)**

Activities

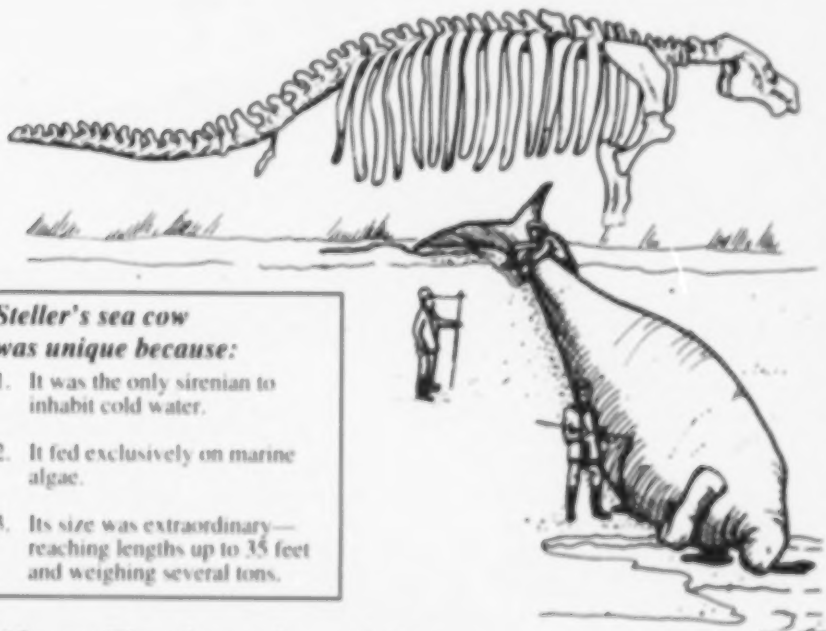
- *Discuss line, bar, and pie graphs and how they can be used. Using the information provided on this page have students design manatee mortality graphs.*
- *Or reproduce the graphs on the chalkboard to stimulate class discussion on manatee mortality. What do students think the next few years will look like for the manatee?*
- *Refer to the six categories listed above. Discuss them with your students. What causes of death might be placed in the Other Natural category? Undetermined? What is a Dependent Calf (Perinatal), and why do you think this category shows a higher percentage of deaths? Why aren't some manatees carcasses recovered?*
- *Discuss the words "obituary" and "eulogy" with your students. Bring in a copy of the obituary in a newspaper to share with the class. Have the students write an obituary about a manatee using different ways that manatees died (boat propellers, fishing line, cold weather, etc.)*

Manatee Deaths By Category 1979 - 1993

Research and Conservation

Manatees and the Mermaid Myth

Sailors throughout history often thought they were seeing mermaids when they were really seeing manatees or their relatives. "Sirenia", which names the order to which manatees and dugongs belong, comes from the word "siren". In ancient mythology, this was a term used for sea nymphs who lured sailors and their ships to treacherous rocks and shipwreck with their mesmerizing songs. With a little imagination, manatees can have an uncanny resemblance to human form that could only increase after long months at sea. The manatee probably helped perpetuate the myth of the existence of these "half-human" creatures.



Steller's sea cow was unique because:

1. It was the only sirenian to inhabit cold water.
2. It fed exclusively on marine algae.
3. Its size was extraordinary—reaching lengths up to 35 feet and weighing several tons.

Extinction Isn't a Myth

The Steller's sea cow was hunted to extinction in 1768, less than 30 years after its discovery in the Bering Strait. All remaining "mermaid" species are listed as "endangered" or "vulnerable" by the International Union for the Conservation of Nature and Natural Resources, an independent group representing over 100 countries involved in the conservation of wild living resources. Saving endangered species is a global effort, and we must work together to preserve species and prevent them from passing into the realm of fable and out of existence.

What Extinction Means

Extinction means the last individual of a living species has died or been killed, and the species has vanished from the earth forever. If manatees become extinct, like the Steller's cow, they will never return. Extinction has been a part of the natural evolutionary process since life began. Mass extinctions occurred during a few geological periods, probably because of abrupt geological or climatic changes. During most of the geological periods, however, new species formed at a rate greater than that of extinction, and Earth's biological diversity gradually increased. Today, however, there is evidence that the world may be experiencing a massive reduction of this diversity. Some biologists estimate that one to three extinctions are now occurring daily, and that the rate will increase to one per hour by the end of the century. It is likely that over one million species will be lost in our lifetime. This time, through habitat destruction, over-exploitation, and population growth, humans are the cause, and it appears that the consequence will be the loss of a substantial part of the Earth and its life. Reduced diversity will have serious consequences for civilization.

The loss of just one species adversely affects others, just as the alteration of one ecosystem can jeopardize many other ecosystems. As a result of destruction and damage in isolated areas, we ultimately damage the entire planet.

As can be seen by the example of acid rain, air and water pollution can cause diversity loss far from the source of pollution.

Growth Management is Needed to Help Manatees

A very serious threat to the manatee, as well as to the whole of Florida's environment is our burgeoning population. Manatee habitat, and the habitat of many other species in Florida (the list is far too long to include here), has been lost due to our staggering development on all of Florida's ecosystems. Other stresses on our environment resulting from lack of proper growth management include pollution of water, air and soil; stresses on our water supplies and wetlands; salt water intrusion; soil and beach erosion; and degradation of our living reefs, to name just a few. Even the disposal of our garbage has become a problem of great magnitude. To put it simply, we are running out of space to put our garbage.

A consequence of coastal development is habitat loss, so there is a definite connection between human population and the extinction of the West Indian manatee.

The problem of overpopulation is by no means unique to Florida, however. Species extinction, pollution, depleted resources, etc., that we see happening in Florida are occurring worldwide. The Earth, currently with 5 billion people and growing by 89 million people a year, is being devastated by population growth. Among issues of global concern, the loss of the ozone layer (which is linked to population growth) is a frightening phenomenon. And because of our increasing demand for food and living space, we are taxing land beyond capacity. As a result, we have 14.8 million acres of previously productive land turning to desert every year. Through the "slash and burn" technique of farming, we are losing over 27 million acres of invaluable rainforest every year (at this rate, almost all rainforest will be gone in 50 years). We cannot continue to add to our population as we are without destroying the very planet on which we live (and, of course, ourselves in the process).

Besides the environmental damage, current population growth is also at the root of human hunger, poverty, urban deterioration, and economic stagnation. Worldwide, over 800 million people suffer from starvation, with 12 million children under the age of five dying each year. Places like Mexico and Central America, with unemployment rates as high as 30%, will see a tripling of their "potential" workforce in less than 50 years.

There are no easy answers. Some nations are now attempting massive education programs, promoting widespread use of contraceptives, offering incentives for sterilization, or offering "perks" to those who cooperate in a one-child-per-family program. But these attempts are small in relation to the magnitude of the problem. It must somehow be demonstrated to all the disaster that lies ahead if population is not controlled.

To conclude, let's come back to the immediate problem of population growth in Florida. We are not going to stop the large numbers of tourists and new residents from coming to Florida. What we must consider, in order to protect our fragile environment, is carefully planned growth management. As Florida continues to grow, critical decisions about managing our fragile environment must be made. We cannot afford to make decisions based on inadequate knowledge, because the resulting impacts are often irreversible and very costly. Floridians must learn to determine the long and short-term consequences of their decision making. Carefully planned growth and protection of the environment can occur, but only through an environmentally aware and informed society. Therefore, it is up to us to become knowledgeable about local issues and to involve our students in these issues, as well as to inform them of the proper procedures for getting involved in local planning to effect positive change and controlled growth.

Activities

- *Arrange for a trip to a county commission public hearing or a planning meeting.*

- *Discuss reasons for overpopulation. Name five ways overpopulation can directly affect animal populations. Animal extinctions are a result of overpopulation—why? Discuss ways that problems caused by overpopulation could be solved. Write to an organization that deals with population to find out more information on overpopulation.*

- *What are the growth management laws in your state? You can contact the Florida Department of Community Affairs to find out about Florida's growth management laws (904-488-8466). How does growth management in Florida help protect the manatee?*

- *Compare the population of a country in South America with one in Africa. What is the current population, and what is the projected population for the year 2000? What is the percentage of growth? At this rate of growth, what will the population of each country be in 2050? 2075? What are the problems both countries are facing as a result of overpopulation? Next, locate both countries on a world map. Compare latitudes. What kind of climate does each country have? Is there a correlation between climate and population size? Discuss. Finally, what kinds of species are indigenous to these countries? Find out names of other endangered species in both countries and study them. Are there any species related to the West Indian manatee in either country?*

Continued on page 14

Activities

Continued from page 13

- *Trace the 'life' of a bottle from purchase to waste site. How long will this bottle remain in the environment after disposal? Make it a class project to find out more about solid waste and disposal.*

- *Discuss the concern over the rapid destruction of our rain forests. What is "slash and burn"? Talk about what it means to be an "underdeveloped nation". What are some of the things that happen when a country becomes industrialized? What are some possible solutions to stop the destruction and poisoning of our environment? Write a letter to the president of a particular nation and ask what steps are being taken to control population growth. How does the destruction of rain forests affect all the world's citizens? People accept the idea of a "global economy"—what about a "global environment"? Discuss how things that happen in Africa or Australia affect people and animals living in California. Have a debate on this issue or present arguments in a "mock" world court.*

- *Find out what organizations are working on the problem of overpopulation. What is the U.N. doing with regard to overpopulation? Write to one such organization and find out what students can do to help.*

THROWING AWAY FISHING LINE IN FLORIDA WATERS IS NOW AGAINST THE LAW

Manatees are sometimes unintentionally killed or injured by fishing activities. They can drown in nets or they can die from infection caused by entanglement in crab trap lines and nylon fishing line or hooks.

The Marine Fisheries Commission's new rule makes it a second degree misdemeanor to intentionally discard any monofilament fishing line or monofilament netting into or onto the waters of the state of Florida.

Endangered Species & Conservation

Manatees are listed by the U.S. Fish and Wildlife Service as an endangered species. A species is endangered when it is considered in immediate danger of extinction. Many other species are threatened, which means they are likely to become endangered in the foreseeable future. "Endangered" and "threatened" are United States designations which closely parallel the international terms "endangered" and "vulnerable" established by the International Union for the Conservation of Nature and Natural Resources (IUCN). The listing of a species as endangered or threatened brings it under the protection of the law and signals that efforts should be intensified to preserve it.

Preservation of a species is a complex endeavor. Scientific **research** must be conducted to learn what manatees require, how they behave, and what endangers them. With such data, scientists can provide the information and documentation that will lead to their protection.

With so many manatees dying or being injured due to human activity or encroachment, **education** must also be heavily stressed. And education in this state must be constant and unending. Florida, currently the nation's fourth largest state, is growing at an alarming rate, with just under 1,000 new residents every day (not to mention tourists). Many of those moving here are attracted by the state's unique and natural beauty. People are drawn to Florida by spectacular beaches, warm temperatures, and fascinating wildlife. And while Floridians may take pride in the unique wildlife found here, they have no idea how their everyday actions threaten such life.

People who are thrilled to see an anhingha dive under water to snare an unsuspecting fish, or a manatee surfacing to breathe, also need to know that pesticides poison coastal birds, that collisions with boats kill manatees, and that destruction of habitat for new buildings creates a perilous balance with this state's natural resources. Unless those who are lured by Florida also understand and respect it, they will continue to unknowingly mistreat it. Helping people of all ages to understand the environmental issues we currently face in Florida will create the public concern necessary to insure that sound protection for natural resources will be legislated and enforced.

Establishing and enforcing **laws** and **guidelines** is the third vital step in the conservation of endangered species. Establishing regulatory zones, appropriating funds for research, developing and implementing management plans, acquiring land, creating protection zones, and penalizing violators of the law are essential if manatees are to be preserved. However, these protective mechanisms cannot be executed without strong citizen support and involvement—and it's never too early to start. Young people should be introduced to government processes that shape natural resource policy locally, statewide and nationally, so that they are aware they have a voice in Florida's future.

Establishing Laws and Guidelines

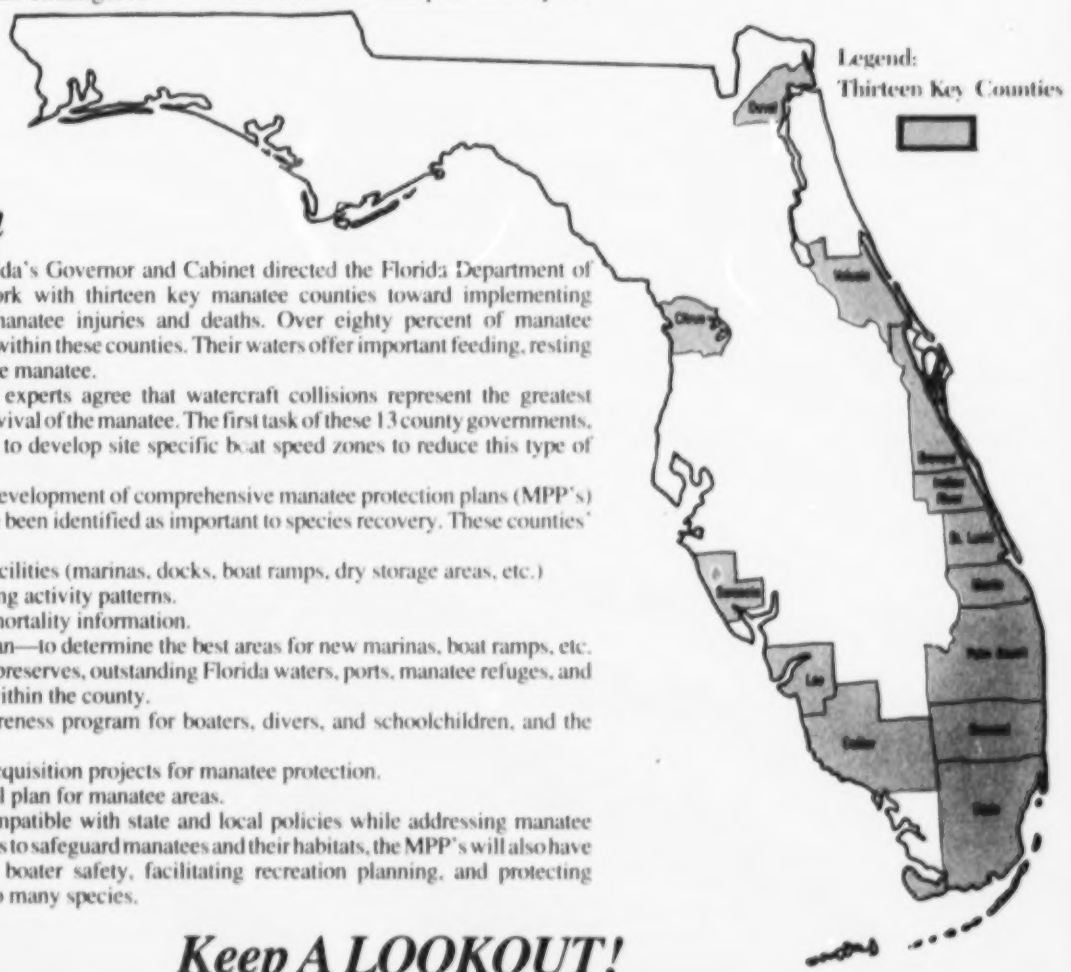
Growth Management Plans must include plans for the protection of wildlife and its habitat. How strong these plans are depends on citizen involvement. With many interest groups gearing up to participate in the planning process, it is vital that those concerned with manatee protection and Florida's environment make their wants and needs known.

The Florida Department of Environmental Protection is involved in preparing and implementing area-specific manatee protection plans. These plans will involve studying particular areas involving high manatee mortality and ultimately making management recommendations for habitat and wildlife protection. Citizen support is vital to the implementation and execution of such plans.

It's The Law...

Manatees are protected by state and federal laws. The Endangered Species Act of 1973 is perhaps the most important federal wildlife law that assists in the protection of manatees and other endangered and threatened species. Under the Endangered Species Act, it is illegal to "kill, hunt, collect, harass, harm, pursue, shoot, trap, wound, or capture" a member of an endangered species. Protection of critical habitat is also provided. The Marine Mammal Protection Act of 1972 also provides federal protection for manatees and other marine mammals, including restrictions on products derived from these animals. Conviction on the federal level is punishable by a fine of up to $100,000 and/or one year in prison.

The manatee is also protected by the Florida Manatee Sanctuary Act of 1978, which states: "It is unlawful for any person, at any time, intentionally or negligently, to annoy, molest, harass, or disturb any manatee." Anyone convicted of violating Florida's state law faces a possible maximum fine of $1,000 and/or imprisonment for up to one year.



Manatee Protection

In October, 1989, Florida's Governor and Cabinet directed the Florida Department of Natural Resources to work with thirteen key manatee counties toward implementing measures for reducing manatee injuries and deaths. Over eighty percent of manatee mortalities have occurred within these counties. Their waters offer important feeding, resting and migratory areas for the manatee.

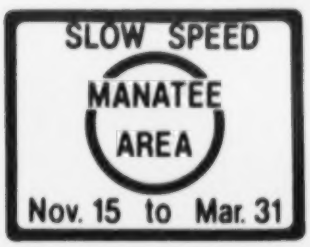
Both state and federal experts agree that watercraft collisions represent the greatest immediate threat to the survival of the manatee. The first task of these 13 county governments, working with the state, is to develop site specific boat speed zones to reduce this type of mortality.

The second task is the development of comprehensive manatee protection plans (MPP's) Thirty-three counties have been identified as important to species recovery. These counties' MPP's will include:

1. An inventory of boat facilities (marinas, docks, boat ramps, dry storage areas, etc.)
2. An assessment of boating activity patterns.
3. Manatee sighting and mortality information.
4. A boat facility siting plan—to determine the best areas for new marinas, boat ramps, etc.
5. Information on aquatic preserves, outstanding Florida waters, ports, manatee refuges, and habitat protection within the county.
6. An education and awareness program for boaters, divers, and schoolchildren, and the general public.
7. Identification of land acquisition projects for manatee protection.
8. An aquatic plant control plan for manatee areas.

The plans must be compatible with state and local policies while addressing manatee concerns. In setting policies to safeguard manatees and their habitats, the MPP's will also have the effects of increasing boater safety, facilitating recreation planning, and protecting estuarine habitat critical to many species.

Keep A LOOKOUT!



This sign is posted on the fringe of seasonal protected areas. You will see it as you approach the areas.

This sign appears in the center of seasonal protected areas.

This sign appears in the Crystal River Sanctuary and Blue Spring Sanctuary. It means no swimming, boating, or diving.

This sign appears on the fringe of protected areas. You will see it as you leave the areas.

More Manatee Information

There are many resource agencies and organizations in Florida whose activities can directly or indirectly affect the West Indian manatee. Below is a listing and description of some of these groups. Many will gladly provide more information on their programs.

UNITED STATES FISH AND WILDLIFE SERVICE (USFWS). The USFWS, under the Department of Interior, is the primary federal agency involved in conservation of the nation's wildlife. The Service operates the National Wildlife Refuge (NWR) system, and refuges, such as Florida's Crystal River, Chassahowitzka, Merritt Island, J.N. "Ding" Darling, and Hobe Sound NWRs, provide important habitat for manatees. The Crystal River NWR, for example, was established specifically to protect the South Big Bend subpopulation of the Florida manatee, and provides winter habitat for almost 1/3 of the manatees on Florida's west coast. USFWS is also responsible for enforcing the Endangered Species Act (ESA) and the Marine Mammal Protection Act regarding the manatee. Funds provided to Florida through the ESA assist in research and protection efforts. The USFWS, Sirenia Project in Gainesville, Florida, conducts field research on basic biology of manatees. For more information contact: USFWS, FISH AND WILDLIFE ENHANCEMENT FIELD OFFICE, MANATEE COORDINATOR, 6620 SOUTHPOINT DRIVE S., SUITE 310, JACKSONVILLE, FL 32216, (904) 232-2580.

CORPS OF ENGINEERS (COE). The Department of the Army, COE, is a federal agency that oversees water resource development in the nation's rivers, lakes, harbors, and wetlands. COE is responsible for maintenance of harbors and navigation channels, including the Intracoastal Waterway, a major migration corridor for manatees. Presently, the COE is trying to locate and identify all areas of importance to manatees in Florida to assist in evaluating the impacts and cumulative effects of activities requiring permit applications. COE, JACKSONVILLE DISTRICT, PUBLIC AFFAIRS OFFICE, P.O. BOX 4970, JACKSONVILLE, FL 32232.

FLORIDA WATER MANAGEMENT DISTRICTS. Florida has five water management districts that provide for management of water related land resources, including preservation of natural resources, fish and wildlife, and promoting conservation, development, and proper utilization of surface and ground waters. They implement the state's Surface Water Improvement and Management program, and most have been delegated stormwater permitting by FDEP. Flood gates and canal locks, which have been responsible for several manatee deaths, are regulated by water management districts. Efforts are under way to reduce and eventually eliminate mortalities caused by these water control structures. Contact the Department of Environmental Protection for water management district addresses.

SAVE THE MANATEE CLUB (SMC) was established in 1981 by former Florida Governor Bob Graham (now a U.S. Senator) and singer Jimmy Buffett as an organization dedicated solely to protecting the manatees and their habitat. The purpose of SMC is to promote public awareness and education; to foster research; and to lobby for the protection of manatees and their habitat, for the recovery of the species in the wild. SMC's Adopt-A-Manatee® program is operated as a means of raising funds to support these programs. SMC, 500 N. MAITLAND AVE., MAITLAND, FL 32751, (407) 539-0990 or 1-800-432-JOIN.

FLORIDA POWER AND LIGHT COMPANY (FPL). FPL is the state's largest electric utility, and five of the company's power plants provide important winter refuge for manatees. FPL is an important contributor to manatee research and conservation by funding aerial surveys, sponsoring public awareness workshops, producing educational materials, and supporting research projects. FPL, ENVIRONMENTAL AFFAIRS, P.O. BOX 088801, N. PALM BEACH, FL 33408-8801.

DEPARTMENT OF COMMUNITY AFFAIRS (DCA). DCA is the state land planning agency in Florida. It is responsible for overseeing the preparation and review of local government comprehensive plans and for administering the Development of Regional Impact and Area of Critical State Concern programs. DCA, DIVISION RESOURCE PLANNING AND MANAGEMENT, 2740 CENTERVIEW DR. E., TALLAHASSEE, FL 32399, (904) 488-8466.

HOMOSASSA SPRINGS STATE WILDLIFE PARK. This Department of Environmental Protection Parks and Recreation facility houses a captive manatee maintenance and research facility. The manatees in this program were either captive-born or recovered from the wild as a result of illness or injury. The public may view manatees in this program in a natural setting from an underwater viewing area. Daily shows are provided to promote public awareness. HOMOSASSA SPRINGS STATE WILDLIFE PARK, 9225 W. FISHBOWL DR., HOMOSASSA SPRINGS, FL 34448, (904) 628-5343.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) The FDEP is charged with the administration, supervision, development, and conservation of Florida's natural resources. The FDEP's Office of Protected Species Management is responsible for reviewing, coordinating, and implementing manatee management programs; formulating boat speed regulations for manatee protection; monitoring state and federal permit applications that affect manatees; and overseeing the sanctuary and sign posting program. The FDEP's Florida Marine Research Institute (FMRI) conducts research programs and manatee salvage efforts. The Florida Marine Patrol enforces all marine related statutes and rules including boat speeds in protected zones. A 24-hour toll free HOTLINE NUMBER (1-800-DIAL-FMP) is maintained to take information about dead or injured manatees. Many of these programs are funded by the Save the Manatee Trust Fund which receives revenue from Florida boat registrations, the sale of manatee specialty automobile tags, and donations by concerned citizens. Information materials can be obtained through FDEP and through various state parks. One example is Blue Spring State Park in central Florida which provides important winter habitat for the manatees as well as educational programs for the public. Written requests should be directed to: FDEP, OFFICE OF PROTECTED SPECIES MANAGEMENT, 3900 COMMONWEALTH BLVD., MS 245, TALLAHASSEE, FL 32399-3000, (904) 922-4330.

FDEP is also the main environmental control agency in Florida and is responsible for water quality programs, wetlands development regulation, pollution control, solid waste and recycling, and power plant sitings—all of which impact on manatee habitats. Dredge and fill activities and pollution sources must be permitted through FDEP, and enforcement action can be taken if pollution laws are violated. For more information contact: OFFICE OF ENVIRONMENTAL EDUCATION, 3900 COMMONWEALTH BLVD., MS 30, TALLAHASSEE, FL 32399-3000, (904) 488-7326.

SEA WORLD OF FLORIDA. Sick and injured manatees in the northern part of Florida are taken to Sea World for rehabilitation, and necropsies are performed on carcasses recovered through the manatee salvage program. Sea World's captive manatees can be viewed by the public. SEA WORLD OF FLORIDA, 7007 SEA WORLD DRIVE, ORLANDO, FL 32809. (407) 351-3600.

FLORIDA AUDUBON SOCIETY (FAS). FAS is Florida's oldest and largest conservation organization. An established leader in natural resource protection, conservation issues, and environmental education. FAS provides information and educational services on native flora and fauna, endangered species, and Florida environmental issues. FAS also works closely with other groups involved in manatee protection. FAS, 460 HIGHWAY 436, SUITE 200, CASSELBERRY, FL 32707. (407) 260-8300.

MIAMI SEAQUARIUM. Miami Seaquarium is involved in manatee education and research, and has an active rehabilitation program for injured manatees found in the southern part of the state, with captive manatees that can be viewed by the public. MIAMI SEAQUARIUM, 4400 RICKENBACKER CAUSEWAY, MIAMI, FL 33149. (305) 361-5705.

FLORIDA GAME AND FRESH WATER FISH COMMISSION. (FGFWFC). FGFWFC is the state agency responsible for management of Florida's wildlife and freshwater fisheries resources. FGFWFC's endangered species activities coordinate with USFWS programs. FGFWFC has conducted aerial surveys of manatee habitat funded by the federal Endangered Species Act. They also operate the successful "WILDLIFE ALERT!" program that provides a reward system for reporting wildlife law violations in Florida. The number to call when you see wildlife being harmed or harassed is 1-800-342-9620. ENDANGERED SPECIES COORDINATOR, FGFWFC, FARRIS BRYANT BLDG., 620 S. MERIDIAN ST., TALLAHASSEE, FL 32301. (904) 488-3831.

LOWRY PARK ZOO. Lowry Park Zoo is a new manatee rehabilitation facility offering year-round care and public viewing of manatees. LOWRY PARK ZOO, 7530 N. BLVD., TAMPA, FL 33604. (813) 935-8552.

Activities:

- *Discuss the composition of a letter and letter format. Have students write a proper business letter to a resource agency using the addresses listed above. Inquire about manatee information and ask how that particular agency or organization works to protect manatees in Florida. (Note: Please send all the letters to one source in a single envelope using the school's return address. This will greatly assist in the agency's response to your students.)*
- *Have students find out more about organizations that work to preserve wildlife. Are they private or governmental? What do they do?*
- *Write your own endangered species protection law. It should answer some of these questions: Why is it important to save the manatee? Why is the manatee endangered? What specific courses of action are necessary to save it? How will they be carried out? Where will the money come from? How can the public help? What will be the penalties for breaking the law? How will it be enforced? If fines are levied, where will the money go? How will you obtain the cooperation of the commercial public sectors?*
- *Find out how aboriginal people in America hunted the manatee before it was protected by law. Aborigines in Australia and the south pacific still hunt the dugong for food.*
- *Discuss the principle of extinction. Why is it important to preserve endangered species? Aesthetic value? Scientific and medical potential? Educational value? Respect for life? Understanding of the delicate, interwoven systems in nature? Economic potential? Tourist appeal? Once it is gone, is it too late to bring it back?*
- *Animals all over the world are competing for space with burgeoning human population. The animals of Africa as well as manatees are losing space. What are some of the ways being used to share space, or reserve space, for animal populations (sanctuaries, game parks, usage regulation, etc.)?*
- *Discuss how a natural balance can be thrown off by over-exploitation. As we destroy countless other species do we make the world a less viable place for humans to live?*
- *Have students role-play as researchers, educators, and legislators. Decide what to do about a particular manatee problem, such as boating-related deaths in a high usage area. Design an education program that would reduce the problem by informing boaters about manatees, using posters, the media, and other forms of communication. Use the information to lobby legislators and convince them to establish protective legislation.*
- *Pretend you are on the city commission in a small town in Florida that is dependent on tourists and recreational boaters. You have to cast the deciding vote on a marina project that will have a serious negative impact on manatees and wetland habitats. It will also create increased boat traffic on the waterway and new jobs by bringing in more tourists. YOUR CHOICES ARE:*
  - *A. Vote for the project because if you don't the public will be angry with you and you will not be reelected.*
  - *B. Vote for the project because you think it is better for the community to have jobs than manatees.*
  - *C. Vote for the project, but insist on as many environmental safeguards as possible.*
  - *D. Vote against the project because you think if you don't the public will be angry with you and you will not be elected.*
  - *E. Vote against the project because you think the community has a responsibility to protect manatees at all costs.*
  - *F. Vote against the project and propose that the community could attract tourists by drawing on the manatee's uniqueness.*

  Stress that governmental decisions are often complex, and politicians must balance their own beliefs and interests with the varied interest and concerns of a multi-faceted constituency.

Manatee Research Programs

With a better scientific understanding of manatees, responsible management and recovery projects can be undertaken. Discussed below are a few of the research activities that wildlife agencies hope will illuminate important conservation issues.

Rescue and Rehabilitation

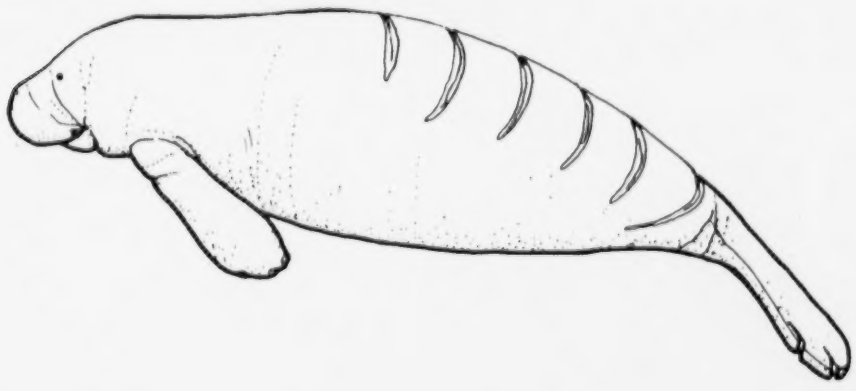
Sightings of sick, injured, orphaned, tagged or harassed manatees can be reported to the Florida Marine Patrol by calling the MANATEE HOTLINE at 1-800-DIAL-FMP. Wildlife officials will immediately investigate and, if need be, coordinate the rescue of sick, injured, or orphaned manatees. Homosassa Springs State Wildlife Park, Lowry Park Zoo, Miami Seaquarium, and Sea World of Florida are all rehabilitation facilities that are authorized to capture, transport, and treat these animals under the joint supervision of the U.S. Fish and Wildlife Service and the Florida Department of Environmental Protection. In addition to those four facilities, other entities are involved in verification of injury, rescue, and transportation with permission of the rescue coordinator at the Florida Marine Research Institute. (FMRI).

The Salvage Program

The Manatee Salvage Program is currently operated by the Florida Department of Environmental Protection. Its purpose is to examine manatees found dead in Florida and other parts of the southeastern United States to try to determine the cause of death. Individual citizens can help by calling the MANATEE HOTLINE (1-800-DIAL-FMP) to report the sighting of a dead manatee. By doing a necropsy on a dead animal, scientists can tell some of the causes of manatee deaths. Other valuable information can be collected concerning length, weight, stomach contents, and pathology. Cause of death is divided into categories (see page 11) and quantified so researchers can better understand the dangers to manatees.

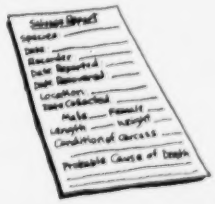
Scar Pattern Catalog Program

About 90% of all manatees that inhabit Florida waters are scarred from collisions with boats. Researchers can use these scars to identify individual animals. By observing an individual over the course of time, researchers can learn many things about migration, travel, important habitat, and other behavioral factors. The U.S. Fish and Wildlife Service, in cooperation with the Florida Power and Light Company, the Florida Department of Environmental Protection, and Save the Manatee® Club, maintains a statewide computerized manatee identification catalog with photographs of distinctively scarred manatees. The catalog contains reports of about 1000 individuals.



Activities

- *Write an essay on why the salvage program is important. If you were a scientist what information could you obtain from the salvage program and how could this information be used to help the manatee survive?*
- *Some counties in Florida have a continually high rate of boat/barge collisions that cause manatee fatalities. Have a class discussion on ways that local officials could rectify this and other problems threatening the survival of the manatee. Students can write their ideas in the form of a letter to a county official or write a proclamation to set aside certain water ways as manatee sanctuaries.*
- *Write the MANATEE HOTLINE 1-800-DIAL-FMP on the board and have students copy it. Ask them to share this information with their family and post the number near their telephone. Explain that the manatee hotline number works similarly to the Emergency 911 number for people and that the quickness in calling these numbers is often the key to successfully rescuing both people and manatees.*
- *Design a research form to be used in the Salvage Program. Some items to include would be: species, sex, length, weight, date reported and location, date collected, necropsy findings, probable cause of death, etc.*



- *Have each student draw an outline of a manatee or a group of manatees. Perhaps they are on an aerial survey and are looking down at a large group of manatees. Have them give each manatee a distinctive scar, tail notch, or both.*
- *How could the manatee have gotten its scar? Draw a picture of the incident or make up a story telling about the event. Add dialogue and make it into a play. Turn your story into lyrics for a song.*
- *Create a scar pattern catalog with each student's drawing and story enclosed for display in your school.*

Activities

- *As a class, design a research program. What would the students like to know about manatees that they don't already know? What kind of research would they conduct to find the answers to their questions? Some examples could be:*

  — Can manatees identify certain sounds? If so, what sounds might repel them away from boats? What would the research project be?
  — Can manatees identify color? People? What research projects could be designed to answer these questions?

- *Nutrition is thought to be a major factor in insuring the good health of manatees in captivity. Foods grown hydroponically tend to be freer of disease than plants cultivated in soil.*

  Grow a vegetable hydroponically. Remember that this would be food strictly for manatees in captivity. Manatees in the wild should be encouraged to forage for food themselves so as not to become dependent upon humans.

  YOU WILL NEED:
  — a shallow box, pot or bowl approximately 6 inches deep.

  —growing medium (aggregate)—vermiculite, coarse sand or small pebbles.

  —water, light, and ample air circulation.

  — seeds.

  ***1.** Make holes in the bottom of your container (one or two is sufficient) and fill the bottom with gravel or pebbles for proper drainage.*
  ***2.** Fill the container with aggregate.*
  ***3.** Visit your local garden supplier and purchase some fertilizer salts. Add to water and sprinkle over your aggregate. Wait for excess water to drain, then plug the holes in the bottom of your container.*
  ***4.** Try an easy plant to grow, such as lettuce.*
  ***5.** Bury the seeds about 1/4 inch from the surface and cover them with aggregate. Keep aggregate constantly moist and your plant should appear in about seven days.*

  (Note: True hydroponics does not require aggregate; however, it would be much more difficult to experiment in the classroom without using it.)

Tagging Program

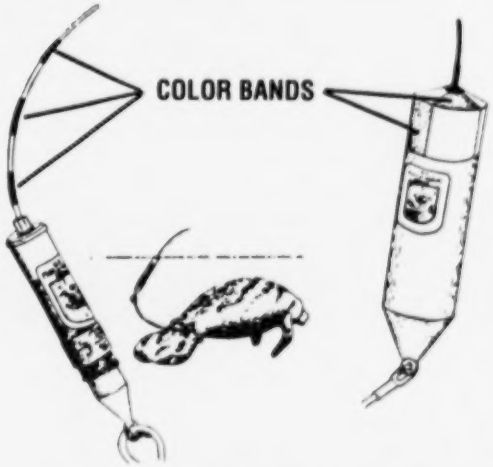
Another important part of manatee research, conducted by the U.S. Fish & Wildlife Service and the Florida Department of Environmental Protection, is to determine animal movements and critical habitat. The radio and the satellite tag assembly allows researchers to follow individual manatees for up to two years without causing harm or discomfort to the animal. A belt is attached around the base of the tail and connects to a flexible tether and floating transmitter. While the flexible tether is designed to avoid entanglement in debris, a machined groove weak point allows the manatee to break free if the tag gets caught. Unique color band combinations at the top of each transmitter are used for visual identification of individual manatees. ANYONE SPOTTING A TAGGED MANATEE IS URGED TO CALL 1-800-DIAL-FMP (be prepared to report exact location, date, time and color coding of tag).

Researchers have been able to record some interesting and informative manatee movements as a result of the tagging program. One manatee made a 200-mile trip from Brevard County to Port Everglades in less than 10 days. Several rest stops along the way were also documented. Another manatee moved between Fernandina Beach and Brevard County seven times, making this 150-mile trip in less than 4 days on at least one occasion. She swam nearly 45 miles per day and traveled into the Atlantic Ocean and along the beach for several portions of the journey. These rapid, long distance movements had not previously been documented for individual manatees.

Data obtained from aerial surveys and the tagging program are used to identify important manatee habitats, have aided in the establishment of manatee protection zones in Florida, and will help with the designation of new areas in the future.

MANATEE TAGS

IF YOU SEE A MANATEE WITH A TRANSMITTER, PLEASE CALL THIS TOLL FREE NUMBER:1-800-DIAL-FMP. NOTE WHERE AND WHEN SEEN, AND POSITION OF COLOR BANDS.



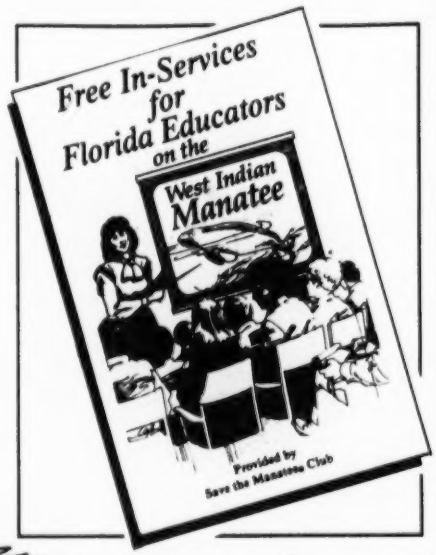
PLEASE DO NOT TOUCH OR GRAB THE TAGS— THEY ARE HARMLESS TO THE MANATEE.

YOUR REPORTS HELP FLORIDA DEPT. OF ENVIRONMENTAL PROTECTION AND U.S. FISH & WILDLIFE SERVICE'S RESEARCH ON THE ENDANGERED MANATEE.

Public Awareness - How You Can Help

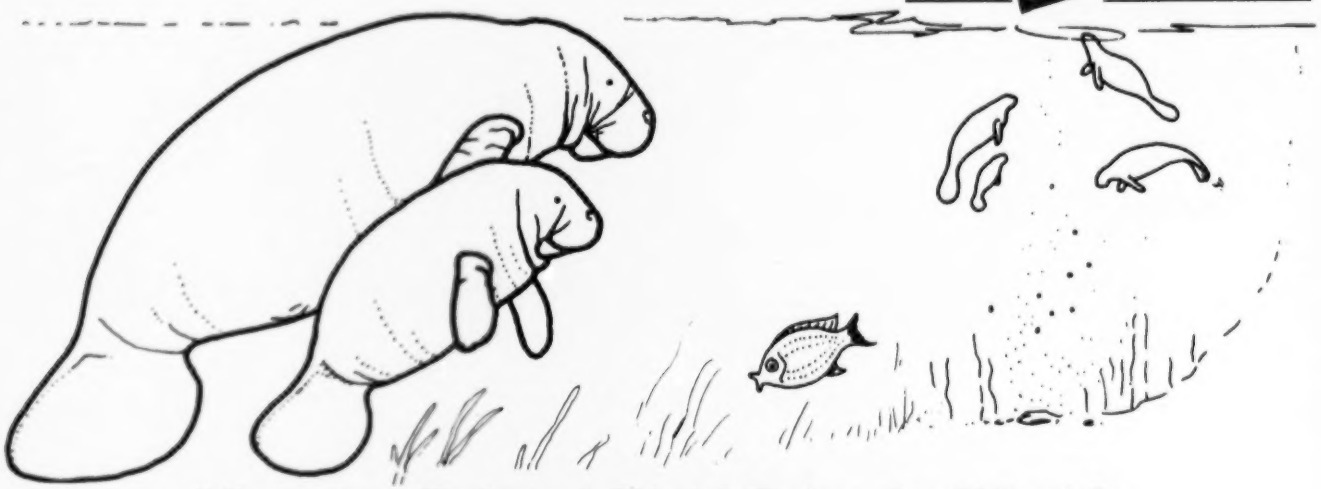
Teacher In-Services

Save the Manatee® Club offers free in-service programs on the West Indian manatee to educators throughout Florida. In-services are available in 2 hour blocks and cover general description, physiology, behavior, communication, reproduction, habitat, range, food, related species, mortality/endangered status, and ways we can all help. Various activities to enhance student learning will also be shared. For more information, contact SMC's Communications Director at (407) 539-0990.



Looking for a speaker to discuss manatees with your class?

Save the Manatee® Club has put together a manatee speaker's list. Contact SMC's Volunteer Director at (407) 539-0990, for possible speakers in your area.



Manatee Related Field Trips In Florida

(listed by county)

Citrus Homosassa Springs State Wildlife Park. Year-round. Several manatees can be viewed from an underwater structure at the Spring's headwaters. Interpretive program and group rates available. For more information, call (904) 628-5343.

Dade Miami Seaquarium. Year-round. Interpretive program and group rates available. For more information, call (305) 361-5705.

Hillsborough Tampa Electric Big Bend Manatee Viewing Center. An environmental education facility with exhibits about the manatee and its habitat. Open Wednesday through Saturday 10:00 a.m. to 5:30 p.m. and on Sunday from 1:00 p.m. to 5:30 p.m. No entry fee. Opens the day after Thanksgiving and closes on March 31. Call (813) 228-4289.

Hillsborough Lowry Park Zoo. Year-round. Self-guided program. Guided tours also available at group rates - 3 week notice required. Call (813) 935-8552 ext. 200.

Orange Sea World. Year-round. Behind-the-scenes interpretive program and group rates available. Call Guided Tours at (407) 351-3600.

Osceola Walt Disney World Epcot Center—Living Seas Pavillion. Year-round. Call (407) 824-4500.

Volusia Blue Spring State Park. Winter months only. Observation deck for viewing manatees in their natural winter habitat. Interpretive programs available. Park fee will be waived with a school letterhead letter. For more information, call (904) 775-3663.

How Can You Help Manatees?

As educators, you have a major role in saving the manatee. So much of the time, manatees (and other wildlife) are harmed by people who just don't know that their actions are harmful. By exposing your students to these animals, their problems, and new attitudes in dealing with these problems, you can create the kind of concern that will ultimately make the difference for this endangered species.

Let's Start By Smashing The Myths.

Many of us, students and teachers alike, have attitudes and reactions towards animals that are based on myth and misinformation. Snakes, for example, often elicit fear in people. A common reaction of a person seeing a snake is to immediately kill it. And yet, not only are most snakes harmless to people, they make important contributions to healthy ecosystems. Wolves, sharks, bats, and spiders are among many other animals that often are killed needlessly as a result of misunderstanding and myth.

Manatees are not exempt from such misunderstanding. One common myth involving the manatee is that they are not native to Florida, and like other exotic species, may actually be doing harm to the ecosystem and to native species. This myth lends support to the position that we should not be concerned with their protection. (Just to set the record straight, fossil records of sirenians indicate they have inhabited Florida waterways for over 45 million years.)

So you see, it is important to help students examine their attitudes and reactions to different animals. They need help in separating attitudes and reactions based on actual experience and information from those based on misinformation and myth, and in looking at contributions made by these animals.

Teach Students To:

LOOK AT
THE BIG PICTURE

To help the manatee, students must develop a concern for the environment as a whole. Individual species are not isolated in this world. What happens to one, ultimately affects others. And we, too, are part of this whole. Our actions and behaviors affect the world around us.

Considering the 'END RESULT' Of Our Actions.

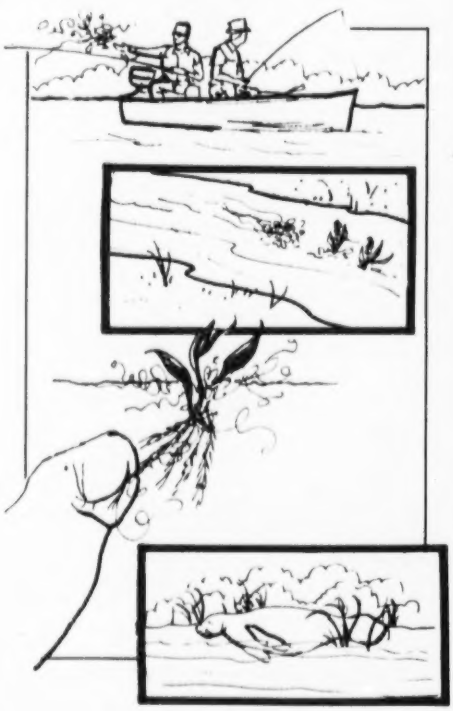
An important concept for students to consider is the progression of events that may occur as a result of an individual's action. Page ten of this educator's guide lists several causes of manatee deaths which are directly related to human contact or encroachment.

*Discuss **ACTIONS** and **RESULTS** as they relate to manatees.*

ACTION ⟷ **RESULT**

*Here's some **ACTION** examples to get you started:*

- Following posted speed zone signs in manatee areas.
- Driving your boat fast in a manatee area.
- Passive observation of manatees.
- Touching manatees, feeding them, or giving them water.
- Swimming with manatees.
- Picking up litter on the beach or river bank.
- Building a dock over a seagrass bed.
- Monitoring the opening and closing of flood control structures.
- Throwing monofilament line or plastic into the water.
- Canoeing down a river.
- Storm water runoff from a heavy rain entering a water body.



What are some possible **RESULTS** of these **ACTIONS?**

What About Everyday Activities?

The choices that we, as students and teachers, make from day to day in our routine activities also impact the manatee and our environment. We don't have to be canoeing down the river to have an impact. We can have an impact from our kitchen or from the school we attend, or from the mall or grocery store! In fact, the way we shop has a major impact on the world around us. Spending our money on a product is like endorsing that product. What we buy tells a manufacturer what to make—we're saying to that manufacturer, "Yes, I want you to continue making and packaging this product just as it is." If a product contains toxic chemicals that can contaminate our water, air, or soil, we could stop buying it and choose an alternative—something biodegradable.

When buying a product made of, or wrapped in, plastic, consider an alternative. Plastic is not biodegradable, so even when we've disposed of it properly it remains in our environment and can kill wildlife, including manatees.

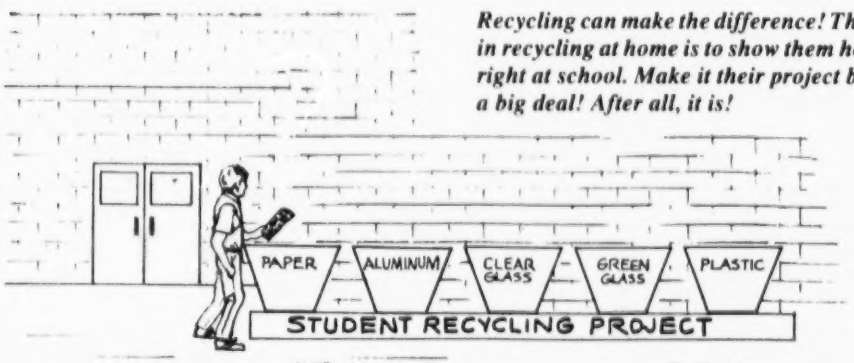
Which brings us to another everyday choice...*What do we do with our solid wastes?*

Disposing of our garbage properly is far better than littering the countryside, and yet, with the current landfill crisis, even proper disposal is creating problems. In just a few short years, if we continue to throw away at our current rate, there will be nowhere to put our garbage.

To Buy Or Not To Buy...

Even buying toilet paper involves some consideration. Colored toilet paper contains dyes which contribute to the high level of mercury in our water systems.

We've also tried dumping our garbage into the ocean (and continue to do so) which is no solution to the landfill crisis. Serious problems have been created at sea as a result. Each year, several million pounds of plastic trash are dumped into our oceans. This means death for thousands of seabirds, turtles, fish, and marine mammals, including manatees.



Recycling can make the difference! The best way to get your students involved in recycling at home is to show them how it's done: Start a recycling program right at school. Make it their project by putting them in charge. And make it a big deal! After all, it is!

You Can Also Help By:
Encouraging Your Students To Get Involved Politically

Students need to know that, as individuals, they have a voice in governmental processes. When they make their wants and needs known, they can improve their world. When they choose to be silent, they give their power away to others. No one is too young to get involved! Students can participate at the local level by attending county commission or city council meetings, and by helping their community to plan wisely for future growth and strong wildlife/environmental protection.

Students can also be involved at the state and federal level by writing letters to legislators and asking them to support environmentally sound laws.

Be sure students understand the importance of being well informed!

Letter writing is a very powerful tool for effecting change. When a lawmaker receives 5 letters on an issue, he/she opens a file on that issue. Twenty-five letters is considered a landslide!

And Finally, Don't Forget To Teach Students

MANATEE ETIQUETTE Or...

How To Behave In Manatee Habitat

Here are a few pointers to pass on...

1. DO NOT ENTER DESIGNATED OR POSTED SANCTUARIES FOR ANY REASON.

2. Abide by posted speed zone signs.

3. When operating a boat, constantly be on the lookout for signs indicating the presence or habitat of manatees. Signs might include: seagrass beds, a snout, back, tail, or flipper breaking the surface; a smooth swirl on the water's surface (created when a manatee below the surface dives deeper); or a human-made sign posted to warn boaters to slow down. If you see any of these, or other signs, drive with extreme caution.

4. While boating, watch for channel markers, and stay in deep water channels. Avoid boating over seagrass beds and shallow areas.

5. Wear polarized sunglasses. They eliminate the glare and enable you to see just below the water's surface.

6. Steer clear of manatee concentrations. Never pass over submerged animals.

7. If you like to water-ski, please choose areas that manatees do not frequent (such as a land-locked lake). The high speeds involved in water-skiing make this water-sport highly dangerous in manatee-sensitive areas.

8. Avoid harassing a manatee. Harassment is defined as any activity which alters the animal's natural behavior.

Please:

- Look, but do not touch the manatee. Also, don't feed manatees or give them water. If manatees become accustomed to being around people, it can alter their behavior in the wild, perhaps causing them to lose their natural fear of boats and humans, and making them susceptible to potential harm. SMC supports *passive observation* as the best way to interact with manatees, and all wildlife.
- If a manatee avoids you, you should avoid it.
- Do not actively pursue or chase a manatee while you are swimming, snorkeling, diving or operating a boat.
- Never poke, prod or stab a manatee with your hands, feet or any other object.
- Do not isolate or single out an individual manatee from its group, and don't separate a cow and her calf.
- Do not attempt to snag, hook, hold, grab, pinch or ride a manatee.

9. Avoid discarding fishing line. It can get tangled in aquatic plants that manatees eat. If manatees ingest this debris they can be injured permanently or even die *(intentionally discarding monofilament line or netting into or onto the waters of the state of Florida is also considered a second degree misdemeanor).*

10. Help keep waterways clean by not littering. You might even want to take this one step further by joining a clean-up campaign in your area (contact local civic groups for information).

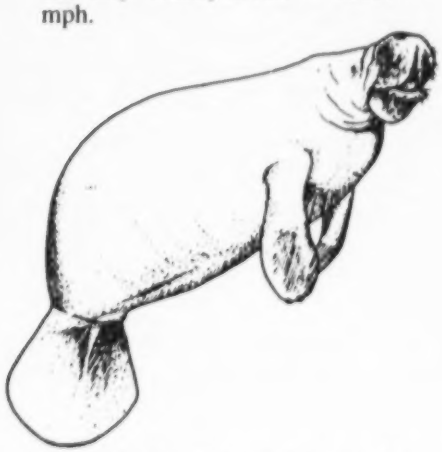
11. If you see a dead, injured, sick or tagged manatee, or one being harassed, call the Manatee Hotline immediately to make a report. The number is 1-800-DIAL-FMP, or ask your operator for the local district Florida Marine patrol number.

Activities

- *Plan a clean-up in your community, stressing public awareness through posters, media attention, public speakers, etc.*
- *Start a student-run recycling program.*
- *Have each class member bring in all plastic trash collected at home in a 24-hour period. Discuss the amount the whole school might collect in one day; the whole city; the state; the nation. Discuss the magnitude of our non-biodegradable solid wastes. Where does it end up? Some marine animals and birds mistake plastic trash for food (such as jellyfish). Others become entangled in plastic trash.*
- *Technologies for making plastics biodegradable are now being explored and implemented. Research the progress being made in this area. What plastic products currently on the market are now degradable? How long does it take before it degrades? Is it also digestible? As such items degrade, is the environment harmed in any way?*
- *Some states and local communities are banning certain plastic products. (For example, as of July 1989, unless they degrade within 120 days, six-pack holders are banned in Florida.) Research how such laws are implemented.*
- *Work out a class plastics consumption plan. Each member may commit to quit buying a product made of or packaged in plastic for a week, a month (whatever the class decides). Chart progress and explore alternatives to these products.*
- *Helium-filled balloons are frequently released into the sky to promote products, celebrate events or call attention to an organization or cause. Like plastic trash, balloons can end up at sea and are mistaken for food by various marine animals. When you hear of a group/business that is planning a balloon release, contact them and inform them that a balloon release can cost marine animals and birds their lives, and that as of November 1990, is against the law. Ask them to consider another attention getter.*
- *Imagine you are a manatee and you have been asked to make a public speech to Florida residents and visitors. What would you most want these people to know? Prepare your speech and present it to the class.*
- *Choose a single manatee fact each day (you can use Trichechus Trivia or the Manatee Fact Sheet for this) that can be read over the school's P.A. system for the entire student body to hear.*
- *When we shop, we often have a choice of having our goods bagged in paper or plastic bags. Discuss the choice here. Which is better? Why?*

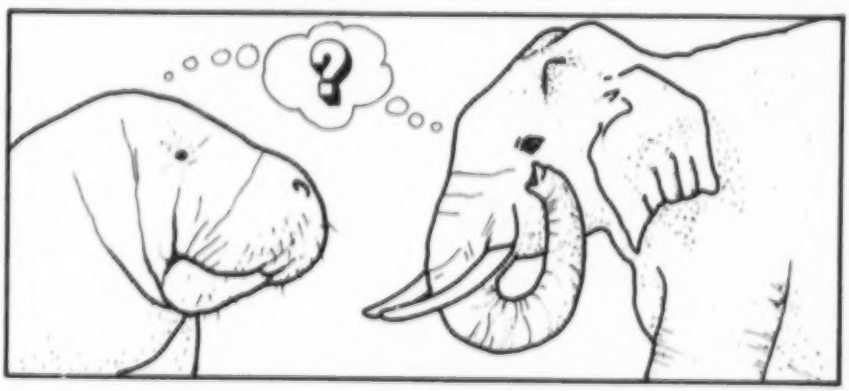
Trichechus Trivia

- The name manatee probably comes from the Carib language. Their word "manati" means "woman's breast."
- No one knows exactly how many manatees exist in the world.
- A manatee can move one side of its lip pads independently of the other side.
- Manatees do not have eyelashes.
- Barnacles can attach themselves to manatees in salt water, but soon die and drop off when manatees return to fresh water.
- Manatees can swim up to 15 mph, but they usually swim at about 5 mph.



- Manatees sometimes groan when they stretch.
- Flatulence is common in manatees.
- By identifying manatees at different winter aggregation sites, scientists have ascertained that, while some manatees change sites, most manatees revisit the same winter sites.
- A few manatees have been found to travel nearly the entire length of the Florida east coast, which is proof that manatees can cover great distances.
- The chewing rate of a manatee has been timed at 2 chews per second.

- During the 1800s a manatee skeleton was worth about $100.
- Manatee hides were used in Columbia, South America, in making special whips for slave owners.
- Shakespeare refers to manatees as "sea maids" in *A Mid-Summer Night's Dream.*
- In 1875, Jules Verne wrote about manatees in his book, *The Mysterious Island.*
- A manatee's heart beats at a rate of 50 to 60 beats per minute.
- A manatee's heart rate decreases from 50 to 60 beats per minute to about 30 beats per minute during an 8-minute dive.
- Each breath of a manatee renews 50% of the air in its lungs.
- A manatee's teeth are constantly being replaced, so it is impossible to tell a manatee's age by this old technique.
- Manatees are the only aquatic mammals that are herbivores.
- A manatee cannot turn its head sideways, so it must turn its whole body around.
- A female manatee who was seen with her calf in the Jacksonville area was rescued from an oil line boom, and 2 months later was identified by her scars. She was over 300 miles away from where she was first sighted.
- The manatee's rib bone is solid, there is no marrow. It is thought they make red blood cells in their sternum where it is known there is marrow.
- Manatees have a nictitating membrane that can close over their eyes for protection when they are under water.
- The word "Sirenia" derives from the sirens of Greek mythology. The sirens were said to lure ships onto the rocks by their mesmerizing songs.
- Water conducts heat away from the body of a mammal up to 25 times faster than does air.
- A manatee's age can be determined by the annual growth rings in their ear bones.
- Of all the mammals in the world, manatees and sloths are the only mammals with six cervical (neck) vertebrae. All other mammals (even giraffes!) have seven cervical vertebrae.



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Manatee Fact Sheet

Name: West Indian manatee

Kingdom:	Animalia	**Family:**	Trichechidae
Phylum:	Chordata	**Genus:**	Trichechus
Class:	Mammalia	**Species:**	manatus
Order:	Sirenia		

Description: Large, seal-like body that tapers to a flat, paddle-shaped tail. Two forelimbs with three or four nails on each. Skin thick and wrinkled with stiff whiskers on snout.

Color, Size: Gray or gray-brown. The average adult manatee is about 10 feet long and weighs about 1000 pounds.

Behavior: Gentle and slow moving. Most of their time is spent eating, resting, and in travel. Often shy and reclusive. No system of defense and completely harmless.

Sight: Depth perception may be limited. Can differentiate colors.

Hearing: Can hear very well despite the absence of external ear lobes.

Communication: Emit sounds that are within human auditory range. They make sounds such as squeaks and squeals when frightened, playing or communicating—particularly between cow and calf.

Breathing: Nostrils on upper surface of snout which close tightly like valves when submerged. Surfaces to breathe every few minutes depending on amount of activity.

Habitat: They can be found in shallow, slow-moving rivers, estuaries, saltwater bays, canals, and coastal areas, particularly where seagrass beds flourish.

Range: Within the United States, they are concentrated in Florida during the winter, but can be found in summer months as far west as Louisiana and as far north as Virginia and the Carolinas. The West Indian manatee can also be found in the coastal and inland waterways of Central America and along the northern coast of South America, although distribution in these areas may be spotty.

Food Source: Aquatic plants. Manatees are completely herbivorous and can eat 10-15% of their body weight daily.

History: Manatees are believed to have evolved from a wading, plant-eating animal, and share a common ancestor with the elephant.

Related Species: West African manatee, Amazonian manatee, dugong, Stellar's sea cow (extinct).

Population: There are a minimum of 1,800 West Indian manatees left in the United States.

Reproduction: The reproductive rate for manatees is slow. Female manatees are not sexually mature until five to nine years old, and males are mature at approximately nine years of age. It is believed that one calf is born every two to five years; twins are rare. The gestation period is approximately 13 months. Mothers nurse their young for a long period and a calf may remain dependent on its mother for up to two years.

Problems: **Human related:** Watercraft collisions, loss of habitat, crushing or drowning in flood gates, poaching, ingestion of fish hooks and monofilament line, entanglement in crab trap lines, pollution, litter, and vandalism.
Natural: Cold related, red tide, disease.

Conservation: Public acquisition and/or creation of sanctuaries in critical areas; research covering biology, mortality, behavior, habitat, and population; implementation of management plans; establishment of regulatory speed zones and the levying of fines for excess speeds in these designated areas; posting of regulatory speed signs in habitat areas; a MANATEE HOTLINE (1-800-DIAL-FMP) for reports of dead or injured animals or manatee harassment; manatee education and public awareness programs.

Legal Protection: Florida Manatee Sanctuary Act, 1978; U.S. Marine Mammal Protection Act, 1972; U.S. Endangered Species Act, 1973.

How You Can Help! Join Save the Manatee® Club.Membership includes a manatee adoption. Funds go toward public awareness, education, research and lobbying. Call **1-800-432-JOIN.**

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Audio-visual Aids

A Second Chance. A 16mm film available from Florida Audubon Society and Florida Power & Light Company, Environmental Affairs, P.O. Box 088801, N. Palm Beach, FL 33408-8801.

The Best of Manatees. Available in VHS videotape. International Video Projects, Inc., 250 Bird Road, Suite 307, Coral Gables, FL 33146. May be purchased through Save the Manatee® Club catalog department.

Manatees: A Living Resource. John E. Reynolds. Available on VHS videotape or filmstrip. Educational Images Ltd., P.O. Box 3456, West Side Station, Elmira, NY 14905.

Manatee Messages: What You Can Do! Produced by Save the Manatee® Club with assistance from the Florida Advisory Council on Environmental Education. Available on VHS videotape in elementary or secondary level formats. Selected videotapes are also open captioned for students with hearing loss. Florida educators, check your school district central media center. Out-of-state educators and other interested parties may purchase a video for $9.00 from SMC.

Manatees: Preserving the Legacy. Available in VHS videotape. Sea World, 1720 S. Shores Road, San Diego, CA 92109-7995 or call (619) 226-3846.

Roll On Manatee. Keith Hastings, Channel 24 (PBS), 11510 E. Colonial Dr., Orlando, FL 32817-4699.

What in the World is a Manatee? Christopher Brown, Docent Films, 5950 Williams Road, Tallahassee, FL 32311.

Please watch your local television listings for:
Living Wild: "Hunters of Dugong." A PBS Special with David Attenborough.
The Undersea World of Jacques Cousteau: "Forgotten Mermaids."

New Data is constantly being collected on the manatee. In light of this, a certain amount of the information contained in the bibliographic sources will be outdated.

Glossary

AQUATIC — growing or living in the water.

AQUIFER — an underground bed or layer of permeable rock, sand, or gravel containing water.

BAY — an inlet of the sea or other body of water, usually smaller than a gulf.

BRACKISH — a mixture of fresh and salt water.

CARNIVORE — a flesh-eating animal or insect-eating plant.

CONSERVATION — the official care, protection, or management of natural resources.

DREDGE AND FILL — dredge is a method for deepening streams, swamps, or coastal waters by excavating solids from the bottom. The resulting mud deposited elsewhere is called fill.

ECOSYSTEM — the interacting system of a biological community and its non-living environment.

EFFLUENT — a discharge of water, which may contain pollutants, into the environment.

ENDANGERED — any species of wildlife whose prospect of survival is in jeopardy; in danger of extinction due to natural or man-made factors.

ESTUARY — areas where fresh water meets and mixes with salt water.

EVAPORATION — the process in which water changes from a liquid into a vapor.

EVAPOTRANSPIRATION — loss of water from the soil (and from bodies of water) both by evaporation and by transpiration from plants.

EVOLUTION — the development of a species, organism, or organ from its original or primitive state to its present or specialized state.

EXOTIC SPECIES — plants or animals that are not native to an area; introduced from another country or place.

EXTINCT — plant or animal species that no longer exist.

GESTATION PERIOD — the period of time between conception and birth.

GROUNDWATER — water below the surface of the ground, often deep below.

HARASSMENT — to bother or annoy persistently.

HERBIVORE — an animal that feeds on plants.

HYDROLOGIC CYCLE — the circulation of water in a cycle where water evaporates from the ocean and land and returns to the earth as precipitation. This water then flows over the surface, through the ground, or is used by plants before evaporating or transpiring and starting the cycle again.

IDLE SPEED — minimum speed that will maintain the steerage of a motorboat.

LAKE — a large inland body of standing water.

MAMMALS— animals that breathe air, nurse their young, have backbones, body hair, and warm blood.

MANATEE PROTECTION AREA — any area with regulations aimed at protecting manatees.

METABOLISM — the chemical and physical processes continuously going on in living organisms and cells.

NECROPSY — a postmortem examination performed on an animal.

NICTITATING MEMBRANE — a thin membrane found in many animals at the inner angle or beneath the lower lid of the eye and capable of extending across the eyeball.

NO WAKE — operation of a motorboat at a speed slow enough to prevent causing a wake.

OMNIVORE — an animal that eats both plants and other animals.

POTABLE — suitable for drinking.

PRECIPITATION — a deposit on the earth of moisture in the form of hail, mist, rain, sleet or snow.

PREDATOR — an animal which obtains food primarily by killing and consuming other animals.

PREY — an animal taken by a predator as food.

REHABILITATION — to bring or restore to a normal or optimal state of health by medical treatment.

RIVER — a natural stream of water of considerable volume.

SALT MARSH — an area vegetated by salt-tolerant plants subject to periodic tidal inundation by salt water.

SALT WATER INTRUSION — the invasion of salt water into a body of fresh water, occurring in either surface or groundwater bodies.

SANCTUARY — a place of refuge or protection.

SPRING — a place where water issues from the ground.

SUBMERGED — to place under or cover with water.

SURFACE WATER — water on the surface of the ground, such as lakes, rivers, or even puddles, and the water in the topsoil.

SURFACE WATER RUNOFF — the portion of rainfall, or irrigation water that eventually is returned to bodies of water. Because this water comes from or passes over paved roads, parking lots, sprayed lawns, and farm areas, etc., it is one of the largest sources of water pollution.

TAXONOMY — a system of arranging animals and plants into natural, related groups based on some factor common to each.

TERRESTRIAL — living on land rather than in water.

THREATENED — any species of wildlife which may not be immediate danger of extinction, but exists in such small populations that it may become endangered if subjected to increased stress from changes in its environment.

TOXIC— acting as a poison; poisonous.

VANDALISM — the deliberate harming of a manatee, wild creature, or natural resource.

VULNERABLE — an international designation similar to the U.S. designation of 'threatened'.

WETLANDS — land where water is the dominant factor determining the nature of soil and the types of plant and animal communities living in the soil or on its surface.

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Adopt A Manatee For Your Class And Help Make A Difference!

Save the Manatee® Club's Adopt-A-Manatee™ program is an excellent way to get students involved in manatee conservation efforts and become "intimately" acquainted with a member of this remarkable species. As a result of this special relationship, students open up their hearts and get "turned on" to the issues affecting manatees and the environment as a whole. Steve Van Matre, an environmental educator, put it perfectly when he said: "Wisdom does not come from understanding, it comes from caring about the things we understand."

Much learning also takes place. As students follow the adoption updates on their manatee throughout the school year, they learn a great deal about the life cycle of a manatee. Migratory patterns (through seasonal movements and through adoptees that are tagged with radio or satellite transmitters), collisions with boats, pregnancy and calving, entanglement in monofilament fishing line, behavioral accounts, winter gatherings in warm water sources — these are just a few examples of manatee life that come to the attention of manatee "parents".

School groups or classes can adopt an endangered manatee for $10.00 through SMC. With each annual membership, classes will receive an adoption certificate, an underwater photo and case history of their adopted manatee, and a variety of education materials. In addition, classes will receive the SMC Newsletter four times a year, complete with adoption updates, education articles, and information on manatee-related issues.

Meet two of the manatees "up for adoption":

HOWIE - Howie is a sleek, large (1350 lbs.) male, known to winter at Blue Spring since 1971. He has no fear of people, which has brought him a certain fame with nature photographers. He also likes to upset the research canoe.

SUCCESS - Success was born in the summer of 1982 to Sweetgums. She has had severe injuries from boat hits but, amazingly, she appears to have recovered fully. Success gave birth to her first calf in 1988, her second in 1991, and her third calf in 1993.

For a brochure with a complete list of adoptees, write Save the Manatee® Club, 500 N. Maitland Ave. Suite 210, Maitland, FL 32751, or call 1-800-432-JOIN.

Save the Manatee® Club News

Adoptive parents receive the SMC newsletter four times a year. Besides the adoption update, many topics and important issues are featured:

Manatee Mortality; Estuaries; Propeller Guards; Tracking Manatees; The Endangered Species Act; How Long Have Manatees Been in Florida?; The Cycle of Seagrass Destruction; Will Manatees Go The Way Of Dinosaurs? ; The Marine Mammal Protection Act; What You Can Do To Help Save Manatees; Environmental Careers.

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Dress up your car with a Manatee License Plate, available at county tag offices in Florida. *Initially, the price of the plate is $27. This includes the annual fee of $17 plus a one-time fee of $10 for the plate itself. Subsequent renewals are $17. After a $2 administrative fee is deducted, the remaining $15 is split between the Save Our State Environmental Education Trust Fund and the Save the Manatee Trust Fund. When you purchase the plate you'll not only be making an important statement, you'll be putting needed funds into the state's manatee protection and environmental education program.*
(Please note: None of these funds go to Save the Manatees Club.)

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